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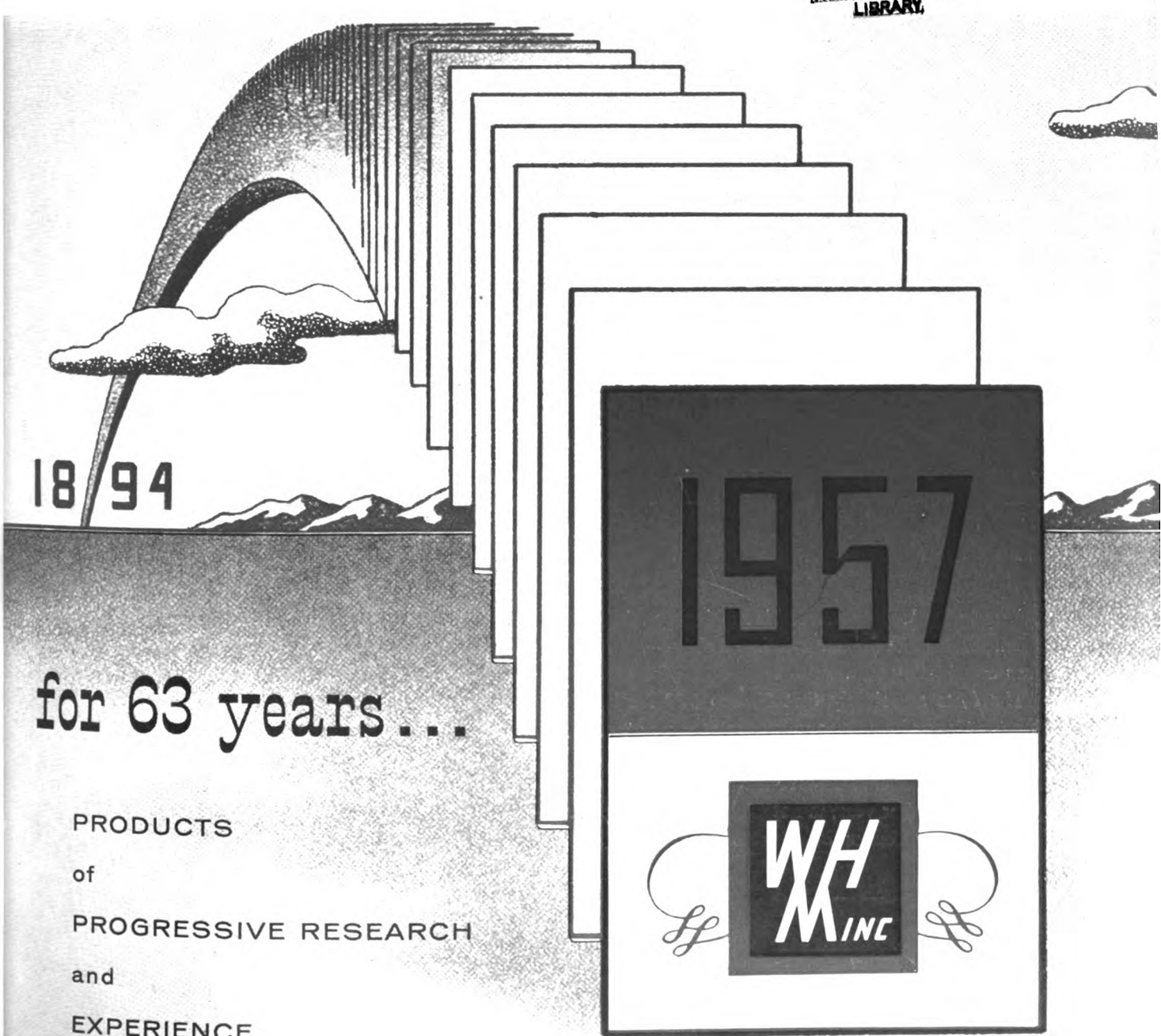

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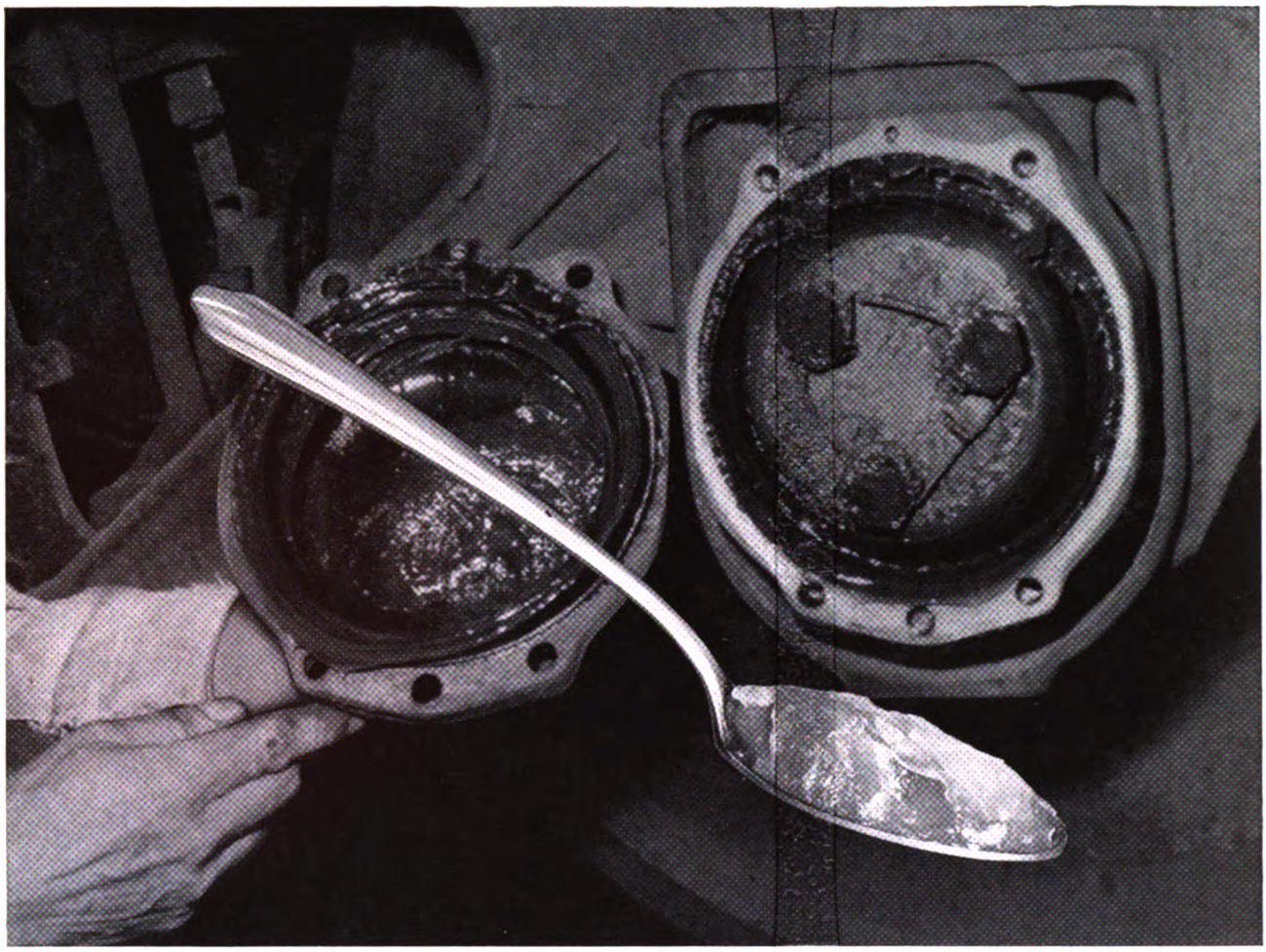

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Founded in 1832 as the American Rail-Road Journal

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Cars, 70-Ton Pulpwood, with One-Piece Cast-Steel Underframes, Mar 59*
Paper Wipers, Disposable, Used in Shops, Dec 6
Sander, Thor Portable, Feb 10*
Saw: DeAll Model 5 Contour, Apr 88*
Saw Safety Guard, Brett-Guard, Oct 60*
Scarred: Design of Two-Piece Transformer Car, Aug 50
Scott Paper Co. Disposable Paper Wipers, Dec 6
Scribed Air Line Cover for Gondola Car Handling Sheet Steel, Mar 55*
Seat: Molded Car: Elastomer Chemical Corp., Feb 84
Security Railway Products Co. Journal Lubricator, Jan 12*
Servo Corporation of America: Electronic Hot Box Detector, Apr 12; June 48*
Set Screw Chain: Hard Inc., Aug 76*
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Boiler Plant at Sayre: LV, May 61*
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B&O at DuBois, Pa., June 40*
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Cleveland Rapid Transit, Oct 40*
NYC Rip Track at Frontier Yard, Sept 50*
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CSS&SB at Michigan City, Mar 68*
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B&M Overhauls RDC Engines at Billerica, Oct 28*
Special Equipment; B&M Billerica Shop, Oct 36*
UP "Lubritorium" at Council Bluffs, June 35*
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Elec. Sec. Report, Aug 55*
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Simplex Electric Co.: Self-Powered Ohmmeter, July 66*
Snap-on Tools Corp.: Socket Wrench Set, Jan 74*; Electronic Engine Analyzer, Nov 78*
Soldering Iron, Kemode Self-Heating, June 10*
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Southern Pacific:
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PS-1 Box Cars with Steel Lining, June 46*; Correction, Aug 8
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Speed Indicator, Barco Model S, Sept 88
Speer Carbon Co.: Brushes with Shock Absorbers, Sept 100*
Sperry Award Honors Diesel Pioneers, Aug 80
Sperry Products, Inc: Electronic Bearing Tester, Apr 6*
Spokane, Portland & Seattle: Quartering Machine Adapted for Boring Motor Support Bearings, Nov 68*
Sprayer, DeVilbiss Portable Paint, July 66*
Spring Packing Corp.: Espey Carliner Panels, Sept 6*
Stack Switch Checker; CB&Q, Nov 72*
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Stand, Diesel Truck Repair; AT&SF, Mar 66*
Standard Car Truck Co.: Cartridge Bearing, Oct 6*
Standard Railway Equipment Mfg. Co.: Steel and Wood Box Car End Liners, Nov 33*
Start Pilot Corp.: Diesel Engine Starting Capsules, Aug 6*
Stewart-Warner Model 708 Electronic Balancer, Apr 84*
Stokes, F. J., Corp.: Impregnator for Pakistan Railways, Feb 66*
Strainer, Watts All-Brass Air and Gas, June 76
Stud Driver-Extractor; E. V. Nielsen, Inc., June 10*
Studs, KSM Welding, Apr 84*
Sun Electric Corp.: Cylinder Leakage Tester, Mar 65*
Swiss Federal Rys.:
Brake Control of Wheel Slip, Jan 46*
Three-Part Car for Handling Heavy Loads, June 56*
Switch, Minneapolis-Honeywell Diesel Safety, May 86*
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Tapes:
Glass, for Armature Banding; Chicago Printed String Co., Sept 92; CMST&P Uses, Dec 38*
Insulating; MM&M Conforms to Irregular Shapes, May 8*; Okonite Okoweld, Oct 64*
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Test Rack for Passenger Car Brakes; UP, Nov 50*
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Air Conditioning Systems; H&M Cars, Mar 56*
C&NW Economy Fuel Tests, Apr 47*
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Thomas & Betts Adaptable Lug, Jan 72*
Thor Power Tool Co.: Air Grinder, Jan 18*; Portable Sander, Feb 10*
Threading Machines: Ridge Geared Pipe, Jan 18*; Ridge Pipe and Bolt, June 82*
Timken Roller Bearing Co.: To Build New Research Laboratory, Jan 8
Toledo Metal Furniture Co.: Heavy Duty Truck, Feb 86*
Toledo, Peoria & Western: Motor Truck Used for Wheel Handling, Feb 48*
Toledo Pipe Threading Machine Co.: Aluminum Wrenches, Sept 92*
Tongs, Heppenstall Heavy-Duty Automatic, Nov 78*
Torch, Morton Miniature Blow, June 76*
Traction Motor Armatures, Glass Tape for, Dec 38*
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Traction Motors:
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Box Car Steel and Wood End Linings, Nov 33*
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Watts Regulator Co.: Compressed Air Filter, Mar 6*; Air and Gas Strainer, June 76
Waugh Equipment Co.: Separable Journal Lubricator, Nov 6*
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Welex Jet Services, Inc.: Hydraulic Draft Gear, Nov 10*
Wells, Martin, Inc.: Electrode Holder, Apr 87*
West Disinfecting Co.: Waterless Hand Cleaner, May 6
Western Maryland:
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Abramovitz, Stanley, July 18
Adams, W. J., Aug 12
Ages, R. L., Sept 108
Airey, Thomas, Nov 18
Alcock, George W., Feb 20
Alfke, W. A., Jan 6
Allan, H. E., Feb 16
Allen, Abram C., Oct 14
Allen, John T., May 14
Almon, William M., Apr 14
Altson, Ralph, Feb 76
Alway, W. W., Apr 12
Anderson, G. R., Jr., Sept 113
Anderson, G. R., Sr., Sept 113
Annis, R. K., June 72
Archer, J. S., Mar 86
Arms, Robert L., Aug 79
Arnold, T. T., Nov 92
Askew, H. W., Dec 14
Atkinson, Murray D., Oct 12
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Bachman, G. F., June 64*
Baker, Ken, May 14
Baker, R. A., Feb 16
Baker, William A., Apr 14
Ball, Earl W., May 93
Ball, Frederick S., Feb 20
Balley, G. D., Mar 84
Bambichler, August N., Oct 14
Baney, H. B., Feb 16; Mar 84
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Barkely, Jack R., Oct 18
Bartel, Harry R., Oct 58
Barth, Victor C., Jan 6*
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Bauer, William, Sept 108
Bauman, Paul J., Sept 110
Bayner, Blair E., Oct 12
Beard, Clarence, May 14
Beauregard, W. S., Mar 86
Beaver, Roy C., Aug 12
Beischer, G. M., Mar 86
Belvin, Charles H., Mar 88
Benger, F. A., Aug 12
Bennett, Kenneth V., Feb 82
Benson, Daniel A., July 10
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Bergen, John W., Aug 80
Bergman, Oscar, Apr 18*
Berti, R. J., Oct 18
Bertram, Martin A., Mar 88
Bess, H. E., Aug 12
Bettcher, W. H., April 12
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Bianco, Pete J., Jr., May 12
Biggan, Patrick J., June 66
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Bissell, Donald H., Mar 88
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Blanford, David, Feb 20
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Bock, W. Kenneth, Dr., Oct 54
Booth, L. H., Oct 12
Borda, John P., June 72
Bourbonnais, Robert H., Mar 89
Bower, Paul N., Aug 12
Boyer, Ralph L., July 18
Bradley, H. C., Feb 20
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Brannon, Jack, July 12
Bray, Robert E., Oct 14
Brittain, Richard J., Feb 76
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Brooker, Clifford C., Nov 20
Brown, A. C., Jr., Feb 78*
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Burroughs, Orrin R., Oct 14
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Butler, Samuel E., May 14
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Byers, B. M., Mar 89
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Carlson, E. A., May 14*
Carr, J. P., July 12
Carrick, R. C., May 14
Carriere, K. G., Jan 6
Carroll, C. H., Aug 12
Case, Austin, July 12
Catchcart, William G., Jr., Nov 88
Cederholm, S. A., May 12
Chalfant, A. S., Dec 16
Chamberlain, Kenneth W., Nov 18
Chambers, I. M., June 72
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Cooke, Randolph B., Jan 8
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Compton, Frank A., Jr., Dec 18
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Cowart, Hansford M., Jr., Nov 20
Cox, A. T., Jr., Mar 89
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Davern, Frederick C., May 93
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Degman, John T., Oct 52
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Johnson, Peter J., Jan 6
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Kirkhuff, L. C., Feb 20
Kleber, J. C., Dec 16
Klein, Thomas F., Dec 18
Kleinkort, Joseph P., Feb 74
Kliment, John L., Oct 46
Klopsch, Walter M., Jan 64
Koenig, E. F., Jan 8
Korn, Carl A., June 64
Krajicek, R. W., Mar 89
Kramer, Maurice G., Jan 8
Krauss, Eugene L., Feb 20
Kreamer, Lou, June 74
Krepps, W. K., Feb 76
Krueger, T. W., Mar 89; July 18*
Kussuth, F. J., Sept 108

Laake, Fred A., Nov 88
Lacy, E., Mar 89
Lalonde, F. R., May 12
Lang, C. H., May 14*
Laret, Philip A., Feb 82
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Laurin, A. A., Mar 86
Lawrence, John, Dec 18
Lawrence, W. J., Dec 16
Lawson, Richard C., Feb 76*
Lay, Robert F., Aug 83
Leavenwood, W. H., Aug 12
Lee, Henry, Dr., Nov 94
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Lemieux, Armand, Nov 18
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Leschenko, Chester W., Sept 112
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Lewis, B. E., June 14
Lewis, Lloyd W., Aug 83
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Lincoln, J. J., Jr., Feb 78*
Lindberg, Ramon I., Mar 89
Lindh, Leonard W., Aug 79
Lineker, R. L., June 72
Lock, Harry, Apr 18
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Loveland, J. W., Dec 16
Lowe, G. R., May 14
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Ludwig, J. R., June 72
Lund, Stanley C., May 12
Luzius, Edward F., Mar 88
Lyons, W. W., Sept 14
Lytle, L. C., Jan 6

Maahs, Carl E., July 10
MacDonald, John L., Apr 16
MacDonald, R., Jan 6
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MacKinnon, J. H., May 12
Madden, W. J., Apr 14; May 14
Magnusson, Carl, Nov 18
Maguire, Howard B., Dec 22
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Marcussen, Arthur J., Feb 76*
Mardick, John A., June 72
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Martin, J. P. A., May 12
Martin, L. W., Mar 84; Oct 14
Marvin, F. R., June 14
Mathews, James R., June 72
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McConnell, Albert J., Aug 80
McCosh, William C., Feb 76
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McDaniel, R. R., Feb 20
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McMullen, Albert J., June 70*
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Smith, Carl F., July 12
Smith, G. Leonard, Feb 74
Smith, George S., Sept 109
Smith, J. A., Mar 86
Smith, J. C., Oct 12
Smith, J. T., Sept 14
Smith, James A. W., Mar 86
Smith, Robert J., Dec 16
Smith, Stuart H., Jan 64
Snedeker, John H., Jan 64
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Wiley, C. C., Feb 74
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Williams, Walworth B., Nov. 18
Willihnganz, Dr. Eugene, Oct 54
Willis, Newton H., July 18; Dec 22
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Winkle, Marion, Sept 109
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Woempner, R. L., Aug 12
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Zane, Robert B., Feb 74
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Byrnes, Edward J., Jr., Dec 22
Capra, A. Lou, Oct 58
Cole, Emmett J., Oct 58
Coolidge, John S., Dec 16
Corneils, Clarence C., Oct 18
DeWitt, Douglas M., Oct 58
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Hickey, William D., June 74
Johnson, Harold H., Oct 58
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Ruttger, Fred W., May 14
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Sherman, Frank V., June 64
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NEW PUBLICATIONS

ASTM Manual for Rating Motor Fuels by Motor and Research Methods, Feb 16
ASTM Standards on Petroleum Products and Lubricants, Apr 12
AAR Refrigerator Car Fan System Report, Aug 8
Axle Research, Feb 16
Copper and Copper-Alloy Welding Rods, Dec 14
DeVilbiss Service Manual on Spray Equipment, Sept 14
Feasibility of Atomic Energy for Use on American Railroads, May 10
Flammable Liquids Code, 1957, Nov 18
Fundamentals of Welding, Oct 12
Heating Ventilating Air Conditioning Guide 1956, Feb 14
Mechanical Research Reports, MR-271 and 290, Dec 10
New Lessons in Arc Welding, Dec 14
Procedure Handbook of Arc Welding Design and Practice, May 12
Recommended Practice for Repair Welding and Fabrication Welding of Steel Castings, Nov 18
Significance of ASTM Tests for Petroleum Products, Feb 14
Symposium on Vapor Phase Oxidation of Gasoline, Dec 14
Tentative Reference Photographs for Magnetic Particle Indications on Ferrous Castings, Feb 16

1793
8853

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Railroad shops of the nation's leading carriers are boosting wheel production –in some instances up to 300%— thanks to installation of Niles Hydraulic Wheel Borer with side head, and to other fast, efficient Niles railroad shop tools.

Pictured here is a new Niles wheel borer with side head for machining hubs, rims and collars, recently installed in an Illinois Central shop. Soon the Union Pacific, Elgin, Joliet & Eastern, and Milwaukee Railroads will join the industry as users of this money-saving shop tool. Automatic boring feed cycling keeps the machine in almost constant operation. And the addition of the side head makes it possible to handle car and diesel wheels on one machine.

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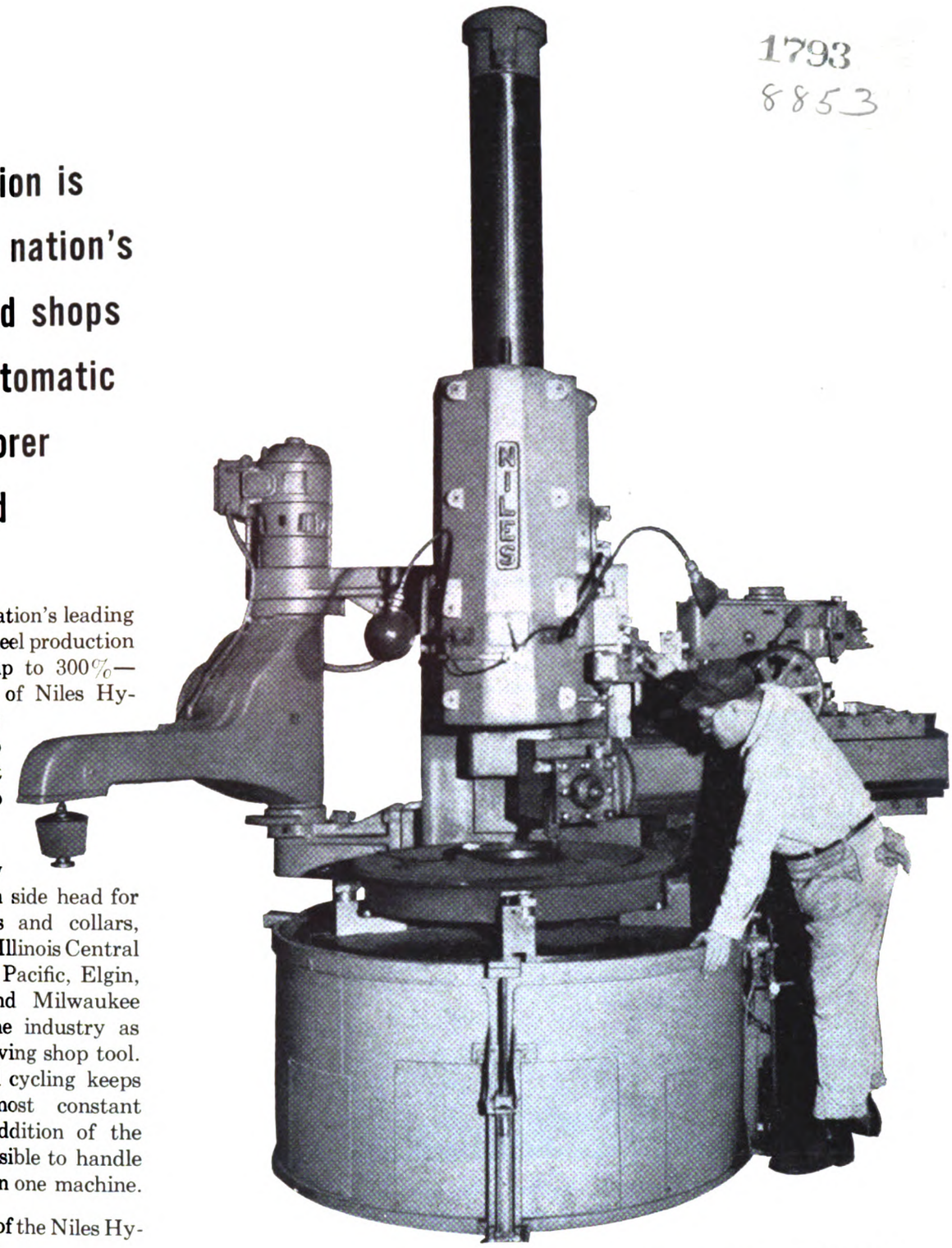

Pictured above is a new Niles wheel borer equipped with side head recently installed in Illinois Central's Burnside shop, Chicago, Ill.

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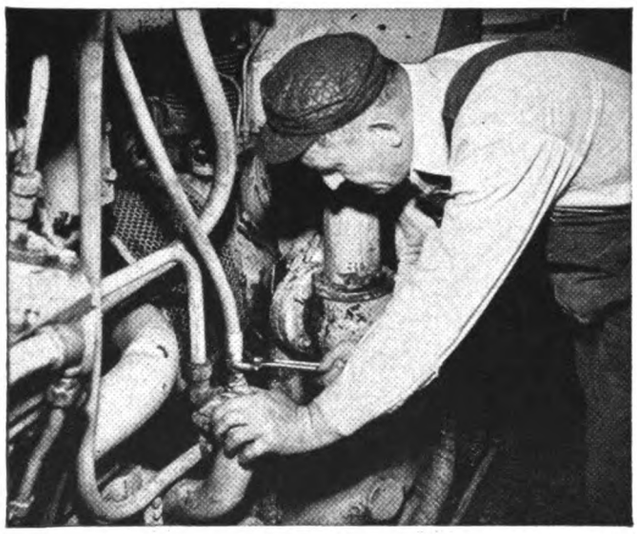

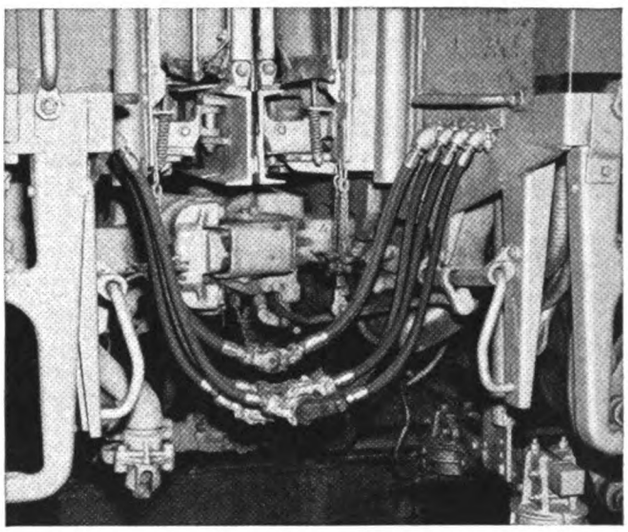

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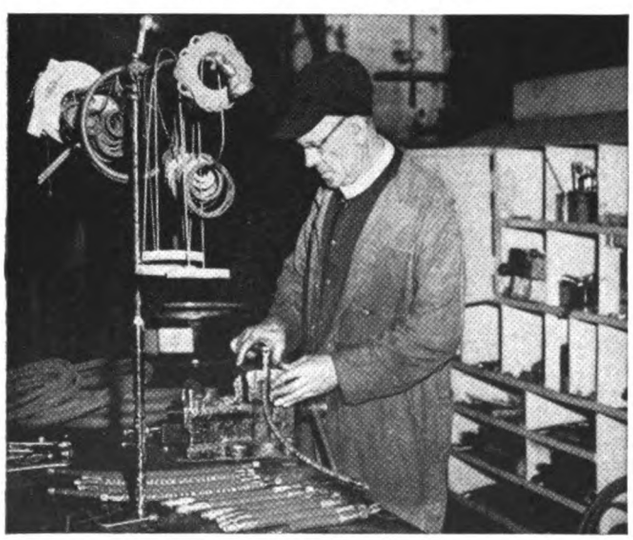

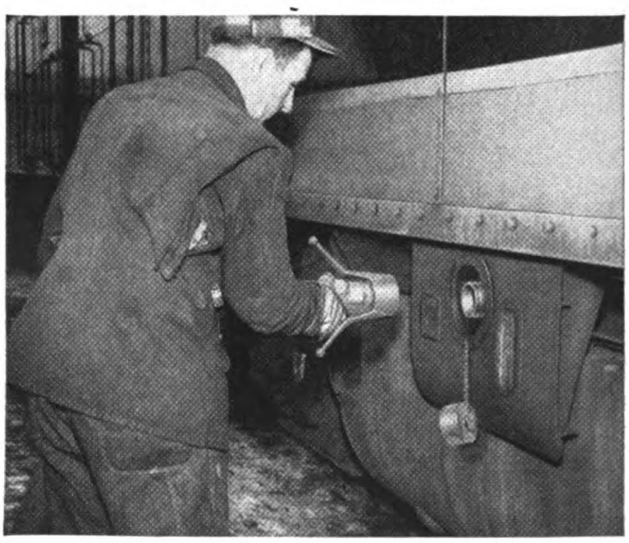

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Founded in 1832 as the American Rail-Road Journal

JANUARY, 1957 VOLUME 131, No. 1

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NEXT MONTH:

New Series starts on Diesel Repairs, "Roll Them Out Like New."

Three Land Transportation Sessions, January 21-23

Twelve papers on land transportation are scheduled for presentation at the Winter General Meeting of the American Institute of Electrical Engineers to be held in the Hotel Statler, New York, N. Y., January 21-23. During the three sessions, latest advances in electrical engineering aspects of locomotives will be discussed. The programs will be as follows:

MONDAY, JANUARY 21

10 AM

"An 8500-Horsepower Gas Turbine-Electric Locomotive," by R. M. Smith, General Electric Company.

"Progress in the Development of the Gas Turbine-Electric Locomotive," by F. D. Gowans and A. H. Morey, General Electric Company.

"The Case for a Standard System of Railroad Electrification for the American Railroads," by T. F. Perkinson, General Electric Company.

TUESDAY, JANUARY 22

9:30 AM

"Electrical Equipment of the New Haven Speed Merchant Locomotives," by T. T. Means and R. M. Henderson.

"Electrical Aspects of High Speed Self-Propelled Trains for the New Haven," by J. E. Burton, the Budd Company.

"Diesel Locomotives with Mechydro Hydraulic Transmission for Lightweight Trains," by S. E. Steinbrook, Baldwin-Lima-Hamilton Corp.

"Design and Analysis of the Motor-Alternator Speed Regulator for the New Haven Speed Merchant Locomotive," by S. W. McElhenny, General Electric Company.

TUESDAY, JANUARY 22

2 PM

"Rectifier Locomotives for the Virginian Railway," by J. C. Fox, Virginian Railway Company.

"The Electric System of the Rectifier-Type Locomotives for the Virginian Railway," by J. C. Brown, General Electric Company.

"Design of Ignitron Tubes for Rectifier Locomotives," by B. E. Belnap, J. L. Zehner and H. E. Zuvers, General Electric Company.

"Report on Progress and Trends in European Electrification," by E. H. Brown, C. B. Lewis, and D. R. MacLeod, General Electric Company.

"Design Considerations for Rectifiers for Railway Locomotives," by C. C. Herskind, J. E. Hudson and W. R. Kettenring, General Electric Company.

Personal Mention

Atchison, Topeka & Santa Fe

W. C. ELLISON has resumed duties as master mechanic, Pecos division, Clovis, N.M.

Canadian Pacific

PETER J. JOHNSON, assistant superintendent of motive power, Eastern Region, Toronto, Ont., retired.

LEONARD WINSLADE appointed assistant superintendent of motive power, Eastern Region, Toronto, Ont.

R. MACDONALD, general locomotive foreman, Winnipeg, Man., appointed division master mechanic, Brandon, Man.

W. J. HOLLOWAY, division master mechanic at Edmonton, Alta., retired.

H. GELL, division master mechanic at Brandon, Man., transferred to Edmonton, Alta.

Chicago & North Western

VICTOR C. BARTH, assistant engineer of tests, appointed chief metallurgist and engineer of tests, Chicago.

Victor C. Barth

Chicago, Rock Island & Pacific

DAVID H. NOBLE, formerly electrical engineer, Central of Georgia, is now research electrical engineer, at Chicago.

Illinois Central

J. R. MITCHELL, division electrical foreman at Clinton, Ill., appointed to newly created position of assistant electrical engineer of equipment at Chicago.

K. G. CARRIERE, diesel supervisor at Chicago, appointed division electrical foreman at Clinton, Ill.

J. T. JONES appointed diesel supervisor at Chicago.

New York Central

W. C. WARDWELL, general mechanical superintendent, Eastern district, appointed general mechanical superintendent—locomotives, system. Headquarters, New York.

Eastern District, New York

E. H. WRIGHT, formerly assistant mechanical superintendent, Western district, appointed mechanical superintendent.

B. L. STROHL, assistant general mechanical superintendent, appointed assistant mechanical superintendent.

Appointed Master Mechanics:

W. A. ALFKE, St. Lawrence, Adirondack and Ottawa Division, Watertown, N.Y.

V. T. BURNS, (car) Electric, Harlem and Putnam Divisions, Mott Haven, N.Y.

C. W. COLE, Syracuse-Rochester Division, Syracuse, N.Y.

J. F. COONEY, Syracuse-Rochester Division, Syracuse, N.Y.

J. E. DEFREEST, Mohawk-Hudson Division, Albany, N.Y.

F. L. HOFFMAN, (locomotive) Electric, Harlem and Putnam Division, Harmon, N.Y.

S. O. HUGHES, Boston & Albany Division, Boston.

L. C. LYTLE, Buffalo Division, Buffalo.

P. R. OLIVER, (car) Electric, Harlem and Putnam Divisions, Mott Haven, N.Y.

R. J. PARSONS, New York Terminal District and River Division, Weehawken, N.J.

T. A. RHOADS, Pennsylvania Division, Avis, Pa.

Texas & New Orleans

P. B. RICE, master mechanic, Houston division and Houston Terminals, has assumed the additional duties of master mechanic, Dallas and Austin divisions, with headquarters at Ennis and Houston, Tex.

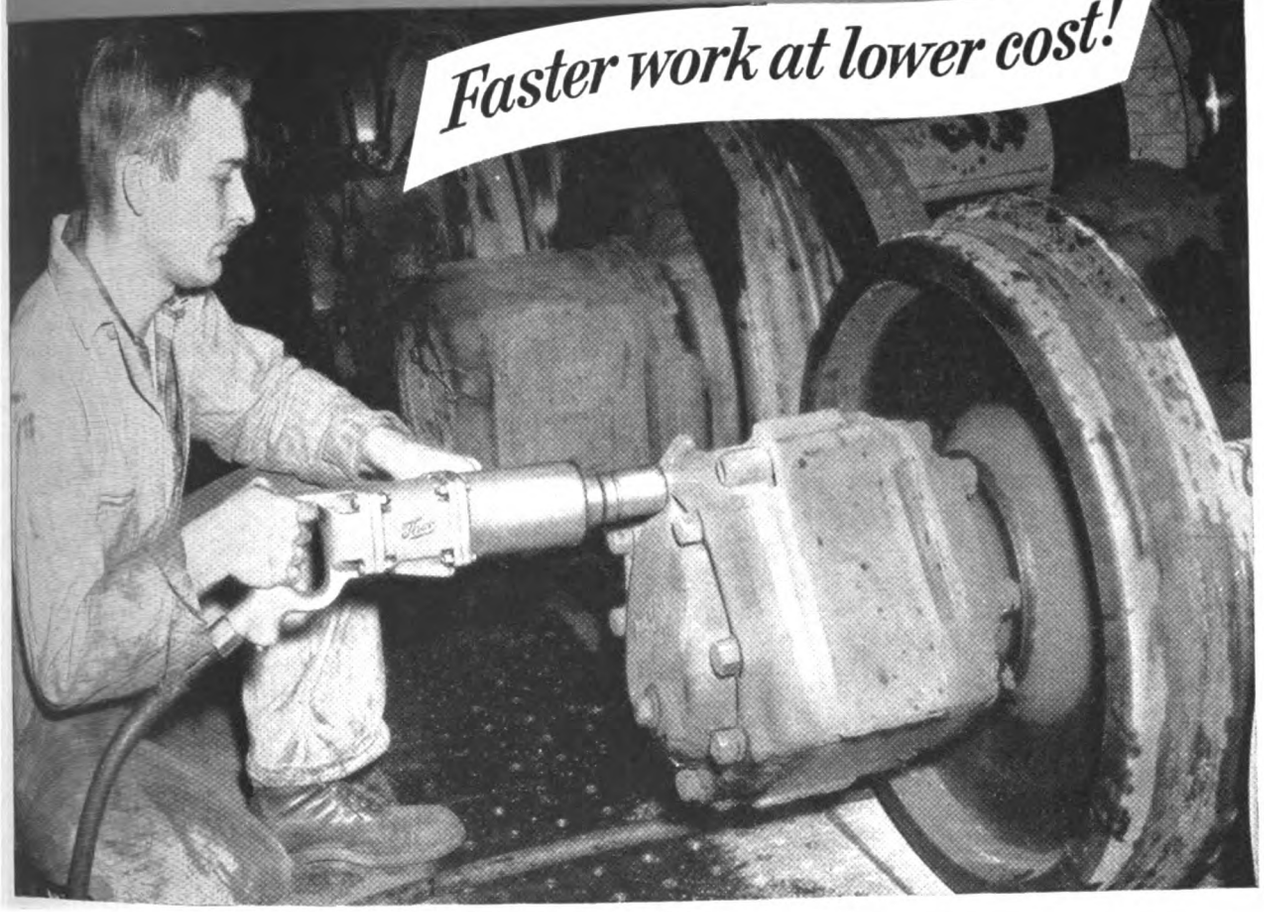
Obituary

JOSEPH LYNN PERKINS, superintendent of shops, Marshall, Texas, died on November 2.

Made to order for railroad shops!

THOR AIR IMPACT WRENCHES

Faster work at lower cost!



THOR Reversible Air Impact Wrenches save a lot of time and money on every operation involving nut running, screwdriving, reaming, tapping, applying and removing studs. Thor Wrenches work faster, with less stress on working parts, because they spin nuts down tighter before impacting. Thor reversible power removes "frozen" nuts, bolts, and screws in seconds. And because there is no torque reaction, Thor Air Impact Wrenches are completely safe.

Low maintenance is assured because Thor ball-bearing motors are fitted into wrenches as self-contained units. Oversize spring never wears out. Finest tool-steel gears are precision cut and heat-treated for endless wear. Thor's line of accessories meets every need. Ask your nearest Thor factory branch for demonstration. Thor Power Tool Co., Aurora, Ill.

COMPLETE RANGE OF SIZES

Thor Air Impact Wrenches are available in all six of the most-wanted sizes: Bolt size capacities include ¼", ⅜", ⅝", ¾", heavy duty ¾", and 1¼".

Thor PORTABLE POWER TOOLS

Atlanta • Birmingham
Boston • Buffalo
Chicago • Cincinnati
Cleveland • Denver
Detroit • Houston
Los Angeles • Milwaukee
Newark • Long Island City, N.Y. • Philadelphia
Pittsburgh • St. Louis
San Francisco • Seattle
Toronto, Canada • Export Division, New York City

THOR POWER TOOL COMPANY

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE DECEMBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and Builder	*No. of units*	*Horse-power*	*Service*	*Other detail*
FERNWOOD, COLUMBIA & GULF: Electro-Motive	1	900	Switching	Delivery April 1957.

FREIGHT-CAR ORDERS

Road and Builder	*No. of cars*	*Type*	*Cap., tons*	*Other detail*
ATCHISON, TOPEKA & SANTA FE: Pullman-Standard	950	Box	50	.....
	150	Box	50	Insulated
DULUTH, MISSABE & IRON RANGE: ACF Industries	500	Ore	70	For delivery third quarter 1957.
WESTERN MARYLAND: Bethlehem Steel	300	Hopper	70	Deliveries of 400 cars scheduled for June and July.
Greenville Steel Car	100	Covered hopper	70	

PASSENGER-CAR ORDERS

Road and Builder	*No. of cars*	*Type*	*Other detail*
BOSTON & MAINE: Budd	3	RDC-1	Estimated unit cost, $175,000. Delivery expected in April.
CANADIAN NATIONAL: Budd	1	RDC-3	Deliveries of eight cars to be completed by June.
	3	RDC-1	
	4	RDC-4	

INQUIRIES AND NOTES

LOCOMOTIVES:
Chesapeake & Ohio.—Directors authorized purchase of 30 diesel-electric units. Cost, $5,700,000.

FREIGHT CARS:
Chesapeake & Ohio.—Plans to build a third experimental "Railvan" which will incorporate modifications suggested by service tests on two prototype units.
Erie.—Will purchase 50 specially equipped "Clejan" type flat cars for use in piggyback service at estimated cost of $560,000.
Rail-Trailer Company.—Requested bids for 200 75-ft flat cars for pooling service it provides to railroads participating in Trailer Train piggyback operations.

PASSENGER-TRAIN CARS:
Chicago & North Western.—Considering purchase of two lightweight, low-center-of-gravity units similar to "Train X" equipment.

Supply Trade Notes

Warren A. Thomas

Austin F. Murphy

GENERAL MOTORS CORPORATION. ELECTRO-MOTIVE DIVISION.—*Warren A. Thomas,* has been appointed district sales manager, Chicago region. *Austin F. Murphy,* assistant sales manager, succeeds Mr. Thomas as rebuild sales manager.

Mr. Thomas became an assembler in the locomotive division of Electro-Motive in 1936, and was subsequently foreman and service technician assigned to the United States Navy; manager of the Diesel Training Center at La Grane; manager of the statistics and market analysis section of the sales department; factory branch sales manager, and manager, of rebuild section, of the sales department.

Mr. Murphy became an operating instructor for Electro-Motive in February 1947 and has since been a service engineer, sales engineer, and assistant rebuild sales manager.

■

WYANDOTTE CHEMICALS CORPORATION.—*Harold R. Suter* has been appointed technical director of J. B. Ford Division of Wyandotte. He will coordinate activities of the division's research, technical service, manufacturing and engineering departments. *Maurice G. Kramer* continues as director of research, in charge of research laboratories. *John M. Daugherty* and *Bernard F. Schmitz* have joined Wyandotte's railroad sales staff, with headquarters in Minneapolis and in New England, respectively.

■

TIMKEN ROLLER BEARING COMPANY.—Timken mill begin construction of a new half million dollar metallurgical research laboratory next spring. To be located near the company's Steel and Tube Division offices in Canton, Ohio, the new building will centralize under one roof many of th emetallurgical research facilities now located in several separate buildings. The research program is in charge of *Dr. Daniel J. Giradi* and more than 75 metallurgical scientists will use the new research center when it is completed.

■

VANADIUM CORPORATION OF AMERICA.—*Harry E. Orr,* assistant vice-president and manager engineering sales, Chicago, has been appointed commercial vice-president in charge of engineering sales, Pittsburgh. *Raymond H. Filsinger,* district manager, Pittsburgh, has been named assistant vice-president, sales, New York, and *Howard H. Wilder,* manager of engineering sales, at Chicago.

■

EDGEWATER STEEL COMPANY.—Chicago district office has been moved to 80 East Jackson boulevard.

■

NICKEL CADMIUM BATTERY CORPORATION.—*Andreas J. Darlson* has been appointed eastern district manager at New York, succeeding *Melville E. Ingalls,* appointed special representative for sales to railroads.

■

SPRING PACKING CORPORATION. —*Randolph B. Cooke, Railroad Supply Company,* Baltimore, has been appointed representative in the sale of Spring Packing products to southeastern railroads.

■

NEW YORK AIR BRAKE COMPANY. —*Thomas W. Johnson* has been elected vice-president.

■

YOUNGSTOWN SHEET & TUBE CO. —*A. S. Glossbrenner,* vice-president of operations, has been elected president, succeeding *J. L. Mauthe.*

■

FROST PAINT & OIL CO.—*John D.* Ristine, formerly vice-president, Grip-Nut Company, Chicago, has become sales agent for Frost in the Chicago area.

■

K S M PRODUCTS.—*Anthony Maladra,* assistant sales manager, has been appointed sales manager, Stud Welding Division, Merchantville, N.J.

■

TEXAS COMPANY.—*R. J. Ronan* has been appointed regional manager—Technical Services, and *E. F. Koenig,* technical representative of the Technical Services Division, Research and Technical Department, both with headquarters at Beacon, N.Y.

■

SPEER CARBON COMPANY.—A new research and development laboratory is being constructed at Niagara Falls, N.Y.

(Turn to page 10)

Elastic Stop nuts were specified in 1949 to provide safety and low-cost fastening on the DL&W's famous Phoebe Snow.

Five years of high-speed passenger service confirms low maintenance cost of Elastic Stop® nuts

Holding fast despite vibration on shock absorber mountings . . . draft gear carriers . . . slack adjusters . . . brake cylinders . . . spring equalizer seats and pedestal tie bars, self-locking Elastic Stop nuts cut maintenance costs substantially on the DL&W modern Phoebe Snow passenger unit. Performing without failures for the past five years they eliminated the need for constant inspection and retightening. Easily removed without damage to bolt threads they can be re-used through many on-off cycles without loss of effectiveness.

Mail the coupon for detailed information on new, vibration-proof Elastic Stop nut fastening methods for locomotives, passenger and freight car applications.

ELASTIC STOP NUT CORPORATION OF AMERICA

ESNA® TRADE MARK

ROLLPIN TRADEMARK

Elastic Stop Nut Corporation of America
Dept. N68-123, 2330 Vauxhall Road, Union, N. J.
Please send the following free fastening information:

☐ ELASTIC STOP nut bulletin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

SUPPLY TRADE NOTES

(Continued from page 8)

Dr. R. J. Rohr

MAGNUS CHEMICAL COMPANY.—*Dr. Robert J. Rohr* has been appointed midwest regional sales manager.

■

TURCO PRODUCTS, INC.—*Paul V. Rebel, Jr.*, has been appointed manager of the Cleveland sales district.

■

P. V. Rebel

C & D BATTERIES, INC.—*Charles N. Schuh, Jr.*, has joined the staff of Packaged Industrial Power, Inc., Jersey City, N.J., sales representatives of C & D in that area. *Clayton J. Roderick* of Gregory-Salisbury & Co., Inc., has been added to the sales staff of C & D in the Jackson, Miss., area. *Richard C. Garland* has joined Charles F. Gross Associates, Philadelphia sales representative of C & D.

■

AMERICAN HOIST PACIFIC COMPANY.—*American Hoist & Derrick Co.*, has expanded its operation to the West Coast and has formed a new corporation, American Hoist Pacific Company, at Seattle. *Charles D. Gould*, of that city, is vice-president and general manager of the new company.

(Continued on page 64)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of September 1956	Month of September 1955	9 months ended with September 1956	9 months ended with September 1955
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	3,964	6,000	35,335	48,555
3-06	Total, Diesel-electric	36,242	35,806	333,369	315,866
3-07	Total, electric	713	807	6,548	6,701
3-04	Total, locomotive-miles	41,193	42,847	377,423	373,093
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,716	1,737	15,124	14,872
4-06	Empty, total	892	911	8,405	8,187
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	9,838	13,968	87,570	112,349
6-02	Total in oil-burning steam locomotive trains	1,901	3,009	11,069	18,870
6-03	Total in Diesel-electric locomotive trains	107,664	103,143	960,353	894,113
6-04	Total in electric locomotive trains	2,311	2,411	20,317	20,409
6-06	Total in all trains	122,635	123,267	1,087,205	1,052,249
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.02
10-02	Loaded freight car-miles	44.8	43.6	43.0	42.8
10-03	Empty freight car-miles	23.3	22.9	23.9	23.6
10-04	Total freight car-miles (excluding caboose)	68.1	65.5	66.9	66.4
10-05	Gross ton-miles (excluding locomotive and tender)	3,200	3,095	3,092	3,028
10-06	Net ton-miles	1,503	1,435	1,416	1,372
12	Net ton-miles per loaded car-mile (M-211)	33.6	32.9	32.9	32.1
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	65.8	65.6	64.3	64.5
14	Averages per train hour (M-211):				
14-01	Train miles	18.4	18.3	18.6	18.7
14-02	Gross ton-miles (excluding locomotive and tender)	58,173	55,993	56,812	55,947
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	47.1	48.4	46.6	46.6
14-02	All	45.2	46.1	44.8	44.0
15	Average net ton-miles per freight car-day (M-240)	999	996	949	910
17	Per cent of home cars of total freight cars on the line (M-240)	40.4	41.1	41.9	46.4
	PASSENGER SERVICE (DATA FROM I.C.C. M-213)				
3	Road motive-power miles (000):				
3-05	Steam	642	1,374	6,861	12,749
3-06	Diesel-electric	19,514	19,590	182,770	182,324
3-07	Electric	1,166	1,251	11,246	11,790
3-04	Total	21,322	22,215	200,878	206,869
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains:	223,176	229,971	2,081,180	2,116,324
4-09	Total in coal-burning steam locomotive trains	4,218	7,935	42,207	72,447
4-10	Total in oil-burning steam locomotive trains	935	4,093	13,767	38,397
4-11	Total in Diesel-electric locomotive trains:	203,913	203,398	1,890,945	1,870,514
12	Total car-miles per train-mile	9.99	9.92	9.92	9.83
	YARD SERVICE (DATA FROM I.C.C. M-215)				
1	Freight yard switching locomotive-hours:				
1-01	Steam, coal-burning	218,314	319,039	2,088,245	2,532,224
1-02	Steam, oil-burning	29,804	55,377	278,502	434,376
1-03	Diesel-electric[1]	3,728,370	3,713,628	34,047,696	32,563,404
1-06	Total	3,980,359	4,094,537	36,446,262	35,589,038
2	Passenger yard switching hours:				
2-01	Steam, coal-burning	5,094	7,469	51,765	76,338
2-02	Steam, oil-burning	2,753	5,777	29,640	46,714
2-03	Diesel-electric[1]	240,050	237,443	2,222,722	2,191,151
2-06	Total	270,583	276,480	2,526,968	2,546,048
3	Hours per yard locomotive-day:				
3-01	Steam	6.8	7.0	6.2	5.6
3-02	Diesel-electric	15.6	16.0	15.7	15.6
3-05	Serviceable	15.6	15.7	15.7	15.3
3-06	All locomotives (serviceable, unserviceable and stored)	14.4	14.3	14.3	13.6
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.61	1.64	1.67	1.66
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.75	.74	.75	.74

[1] Excludes B and trailing A units

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes: System	Foreign	Total	Miles car set off
September, 1952	2,931,130	7,536	13,608	21,144	138,627
September, 1953	2,822,223	6,083	10,195	16,278	173,376
September 1954	2,614,432	6,740	8,882	15,622	167,355
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970

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with *Statite*

and only USG® brushes have STATITE® permanent shunt connections

If you are having trouble with shunts jarring loose or being pulled out, we suggest you try USG Brushes with Statite. Statite is a permanent shunt connection needing no hammerclips. It can't be jarred out even under severe operating conditions, and will assure your electric motors of steady maintenance-free performance. Statite eliminates the need for riveted shunt connections. In addition, Statite shunt connections retain their original low millivolt shunt drop, cannot oxidize, and are unaffected by temperature extremes. USG Brushes are manufactured in a variety of types and sizes for all applications from fractional horsepower to diesel generator. Grades available include carbon and carbon-graphite, electrographitic, graphite, metal graphite, and silver graphite.

224

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SEND THE ATTACHED COUPON . . .
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TITLE_____

COMPANY_____

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Plastic for Drop Windows

Plastic glazing is saving the Pennsylvania $3,500 a year in replacement costs by eliminating breakage of the motorman's drop side-window in suburban multiple-unit cars.

This 2- x 2½-ft glass window was especially vulnerable to breakage. To open, the motorman lowered it into a pocket about 30 in. deep. If he released it prematurely or if it slipped from his hand, the bottoming impact invariably shattered the pane. At the Paoli car shop, where these multiple-units are serviced, it was estimated that the breakage rate for these windows ran approximately 100 per cent annually on all drop windows. Replacement cost, including labor, exceeded $3,500 a year. This recurrent expense did not include sizeable claims for personal injury.

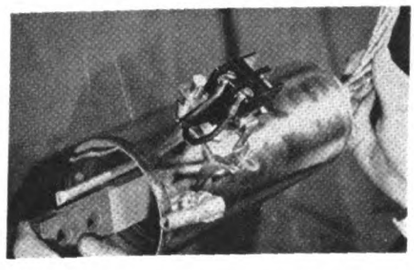
To stop this loss the railroad has been replacing the glass with ⅛-in thick Plexiglas, a shatter-resistant acrylic plastic. To date nearly every mu drop window has been refitted with this plastic. No breakage has occurred; no injury claims have been filed.

Other advantages of the acrylic plastic are weight reduction and the resilience needed if the pane is mounted in an occasional warped sash. Glass under identical stress invariably breaks from vibration alone.

This material is purchased in large sheets, sawed to size, and stacked with the protective masking intact until needed. To allow for expansion with temperature change in service, they are cut slightly undersize. It is installed in two steps. First a semi-soft sealing compound, purchased in the form of continuous strip 1-in. wide, is placed along the edge of the pane and then folded down on each side to form a channel. The pane and the sealer can then be placed in the sash in a single operation, after which the beading is put in place. The manufacturers report that this strip sealing compound maintains its consistency despite exposure to weather and frequent washing with detergents which extract the oils from conventional putty.

All car windows are washed every third day by mechanical washer, using a solution of oxalic acid in water to remove road grime. Pumice and stiff brushes should not be used on this material.

Another breakage problem, less costly but no less a nuisance, has been in the protective window in the 6- x 9-in. metal holders containing the monthly ICC and railroad inspection forms in locomotives and multiple-unit cars. The holders were occasionally dropped. By using Plexiglas, recurrent breakage has been eliminated here as well. *Rohm & Haas Co., Dept. RLC, 712 Locust st., Philadelphia.*

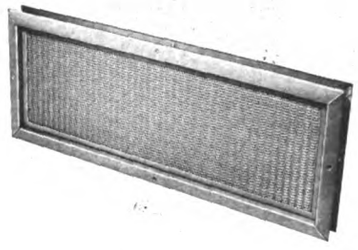


Ignitron Tube

This tube, WL-5822-A, is capable of intermittent ignitor service for the control of frequency-changer resistance welders. It replaces the WL-5822. It is sealed and stainless-steel jacketed and has a 1200 or 1500 volt maximum anode voltage rating with 1500 or 1200 amp maximum anode current.

The mercury-pool tube provides for thermostatic control and, when equipped with proper switches, conserves cooling water consumption and protects it and associated equipment from overloads and overheating.

Overall length, including leads, is 25 in.; diameter, 4¼ in., and net weight, 8¼ lb. *Westinghouse Electric Corporation, Electronic Tube Division, Dept. RLC, Box 284, Elmira, N.Y.*



Door Grille

The Uni-Flo Model ED, door grille is available with two cores. One, vision-proof from any angle, has a free area of 81.5 per cent; the other has a free area of 86.6 per cent. Special baked enamel

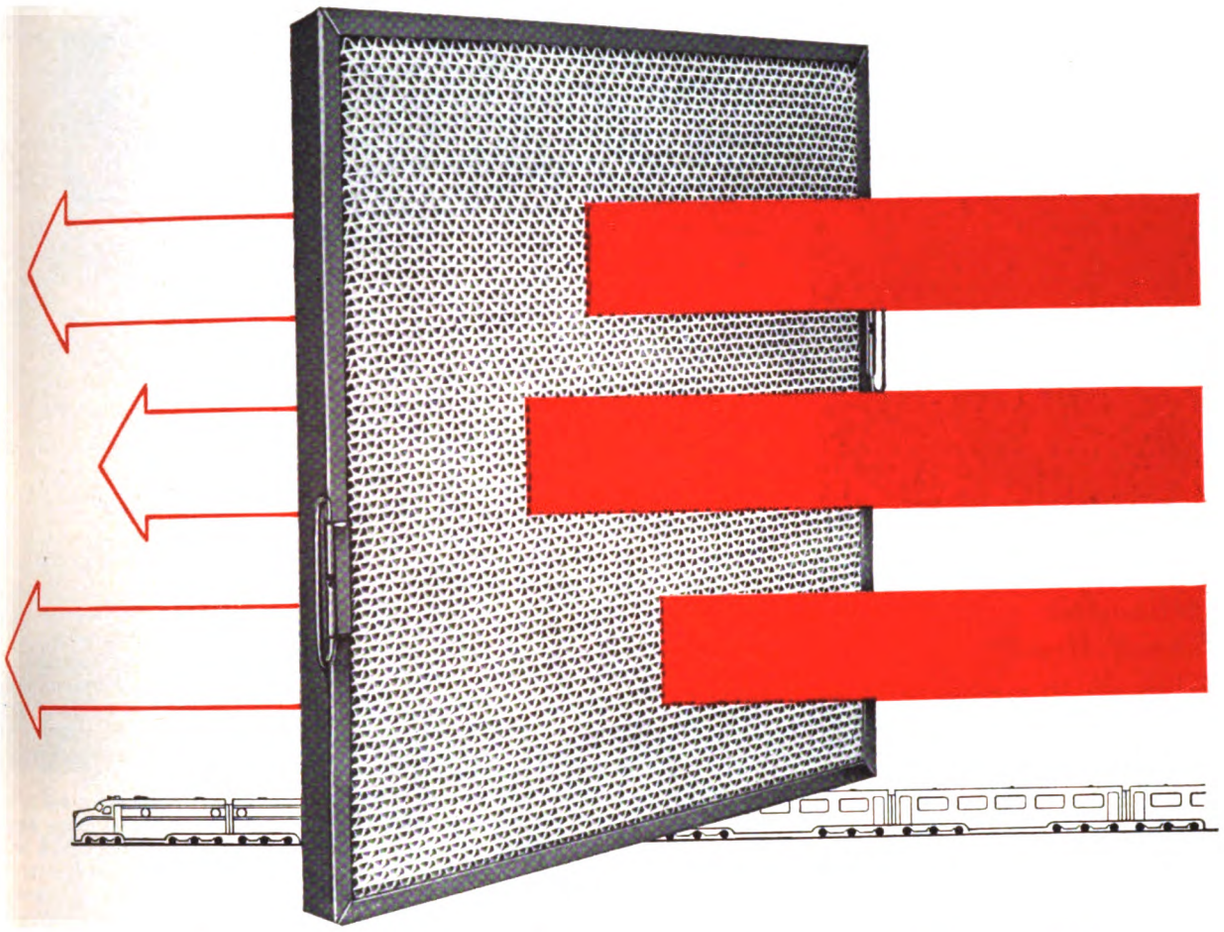
(Continued on page 14)

Journal Lubricator

Called "Journapak," this journal lubricator is AAR approved for interchange operation and is available in sizes for any standard axle, according to its manufacturers. Pad has no hardware or mechanical parts; no drilling or modification is necessary when used in standard boxes.

Consisting of three oil-resistant Neoprene cushions separated from each other, these cushions, in turn, are surrounded by a tufted cotton yarn overcoat. Together these form a flexible, reversible unit that can be positioned without tools and removed by a pull-strap.

This lubricator is said to work on the principle of feeding oil both up around the sections and up through the yarn tufting between the sections. Accordingly, only clean oil reaches the journal, the entire unit acting as both a reservoir for the oil and a filter. *Security Railway Products Co., Dept. RLC, 120 So. La Salle st., Chicago 3.*



Cut maintenance, increase engine life with Esso AIRFIL® Coating Oil

Esso's new AIRFIL Coating Oil for diesel engine air filters has such great dirt pick-up qualities that it can substantially cut maintenance costs and increase engine life. This is possible because of the reduction in abrasive wear, lessening the need for replacements of engine parts. You, too, can profit from these benefits by using Esso AIRFIL Coating Oil in diesel air intake filters, and in air-conditioning filters.

Esso AIRFIL COATING OIL offers three important advantages:

1. Easy to apply... won't drip off. In liquid form when hot, it may be applied quickly in the desired quantity, while at normal temperatures, it is a gel-like solid that won't run off.

2. Superior wicking qualities mean a continually fresh surface is presented to the air. Successive layers of dust are rapidly wetted, keeping dirt-retaining efficiency at a maximum.

3. Insoluble in water . . . won't emulsify, and so resists removal by rain or snow, yet it can be removed quickly by hot detergent wash or steam blast.

Esso offers a complete line of dependable railroad products. Valuable years of experience in research and development, combined with continual testing on the road and in the lab, stand back of the outstanding performance of Esso Railroad products.

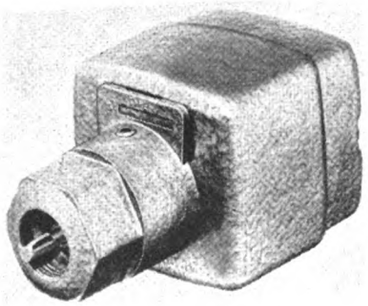
Esso

RAILROAD PRODUCTS

For data sheet regarding specifications of AIRFIL Coating Oil, write to Esso Standard Oil Company, Railroad Sales Division, 15 West 51st Street, New York 19, N. Y.

finishes are available to match any color in addition to several standard finishes.

A telescoping frame provides a 1-in. flange for both sides of the door. The grille can be used in doors from 1⅜ to 2 in. thick. *Dept. 766, Barber-Colman Company, Dept. RLC, Rockford, Ill.*



Tachometer Takeoff Head

Available with AN screw mounts for aircraft tachometer takeoffs, and with SAE screw mounts for gasoline, diesel, railway or stationary engines or compressors, these Series 34 units, when used with the manufacturer's indicators, measure speeds between 100 and 5000 rpm. No brushes, slip rings or other parts requiring replacement are used.

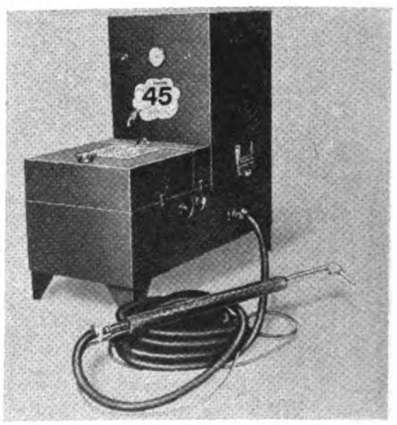
A double-pole, double-throw switch with a capacitor senses speed when the take-off shaft rotates in either direction. It can also transmit a linear current, with respect to speed of the indicator, up to 1,000 ft away. Either one of two stainless-steel keyed shafts are standard. Also, it is available with two alternate shafts—5/16 in. round and ¼ in. square. Ball bearings are ⅝ in. outside diameter. *Metron Instrument Company, Dept. RLC, 432 Lincoln street, Denver 9, Colo.*

Electric Truck Battery

These Super Dreadnaught batteries for electric industrial trucks are available in 3 sizes—the 40 amp-hr positive plate for standard height; the 60 amp-hr positive plate for high-type; and the 120 amp-hr positive plate for extra-high batteries.

The grid of its basic Z construction has been designed for maximum strength. It is non-porous and dense as a result of solidification during casting. Active battery material is regenerative oxide. Plate packs are wrapped in perforated plastic envelopes that permit free electrolyte circulation.

Separators, of micro-porous rubber, have their back web 30 per cent thicker. Ribs are 30 per cent higher and over-all thickness is 30 per cent greater than ordinary separators. Retainers of spun glass form a dense mat that is ½ in. thick and highly porous. *Gould-National Batteries, Inc., Dept. RLC, Trenton, N.J.*



Steam Cleaner

A steady jet of steam at 120 lb pressure for cleaning heavy railroad and industrial equipment is produced in this Model 45 cleaner. It consumes only 1¼ gal of No. 1 fuel-oil per hour to turn 45 gal of water per hour into a steam cleaning jet. The gun can mix a concentrated alkaline with the steam to cut through grease packed dirt. Then the concentrate may be turned off to rinse the piece with clean steam, ready for painting.

A ⅓ hp 110 volt motor, with an overload cut off, drives the positive displacement water pump. The steam is formed in coils which are heated by forced draft fuel oil or city gas fuel fire. A float-control maintains the water supply. Fuel oil capacity provides 4 hr of steady steam cleaning. The safety valve is set at 175 psi.

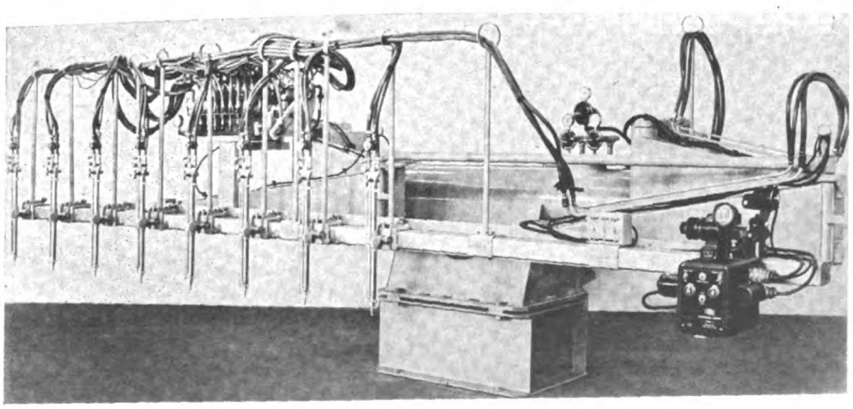
Complete with cleaning gun, 16 ft of wire-braided steam hose and cleaning solution hose, unit is ready to operate by making service connections. Although standard model has no wheels, a three wheel kit is available. *Dept. PR-56. Vapor Heating Corp., Dept. RLC, 80 East Jackson Blvd., Chicago 4.*

Gas Shape Cutting Machine

This medium area oxyacetylene shape cutting machine, the Airco No. 56 Oxygraph, carries automatic cutting equipment—motorized cutting torch holders, solenoid gas distribution system, and the electronic tracer—all remotely controlled. The oxygraph can carry automatic electronic welding equipment as well.

A stationary type with a fixed cutting area (56-in. diameter circle), it can be converted to a larger area, unlimited length machine by adding rails and a traveling carriage. Electronic, manual and magnetic tracers may be used. The basic machine consists of the pantograph arms, the operating bar upon which the torches and tracer are mounted, and a welded pedestal for floor mounting.

The machine is of all-welded steel construction; has pantograph arms of box-girder design; large diameter ball bearings in pantograph arm hinges and operating bar assembly; an electrically operated solenoid controlled gas distribution system, and a panel with accessory outlets. *Air Reduction Sales Company, Dept. RLC, 150 East 42nd street, New York 17.*



Welding Electrode

The Strikeasy 610 is a mild steel arc welding electrode developed with an iron powder coating. It is recommended for use in field construction, including pipelines, car fabrication, and pressure pipe welding, where high quality deposits are required.

Adding iron powder to the electrode coating is said to have improved weld quality, particularly in root passes, because of the reduction in size of the 'wagon tracks' usually formed in mild steel welding. The iron powder coating is said to eliminate slag interference in confined joints or vertical down welding, making these electrodes suitable for tank fabrication, steel casting repair, etc.

According to the engineers, this coating provides a more stable arc. The fast freezing deposit wets and spreads readily as it is applied, reducing the effort necessary to

Another GM contribution to railroad progress

Why your freight arrives earlier than ever before

ONE REASON IS PUSH-BUTTON YARDS which save hours in making up trains. As cars roll down the "hump," a finger-flick guides them through a maze of switches to the proper track. Meanwhile radar and electronic computers evaluate "rollability" (even wind resistance) —automatically actuate retarders which slow the wheels, so each car will roll just far enough to couple gently!

ANOTHER BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. The first cost and upkeep of this new simplified design is so low that railroads can now equip whole fleets of freight cars with roller bearings. Hy-Rolls are eliminating hotbox, lubrication and inspection delays—let freight trains roll on passenger schedules. Husky *straight cylindrical rollers* give HYATT Hy-Rolls greater load capacity—make them easier to install and maintain. No wonder the big switch is to HYATT Hy-Rolls—*the best bearing for the long haul!* Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

Watch "WIDE WIDE WORLD" Sundays on NBC-TV

HYATT Hy-ROLL BEARINGS
FOR NON-STOP FREIGHT

LOOK AT

1.

Longer Service Life

All ASF Extended Life Springs are shot-peened—which cold-works surfaces and more than doubles the life of the spring.

ASF

ALL THREE

...before you specify truck springs!

2. Better Performance

A new heat-treating process makes ASF Extended Life Springs far better able to maintain load-carrying capacity—without permanent set.

3. Lower Cost

ASF Extended Life Springs are now available at no increase in cost over conventional springs. Because they last over twice as long, they cut your spring costs per car mile.

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A contribution to railroad progress...through research by

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

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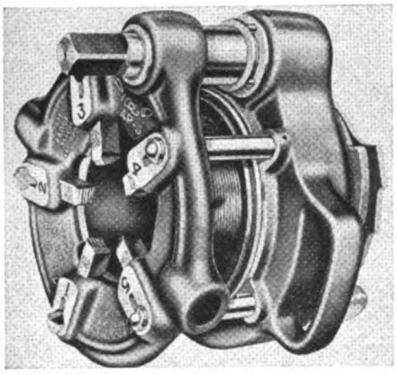
LEADER TO PROGRESS
RPI MEMBER

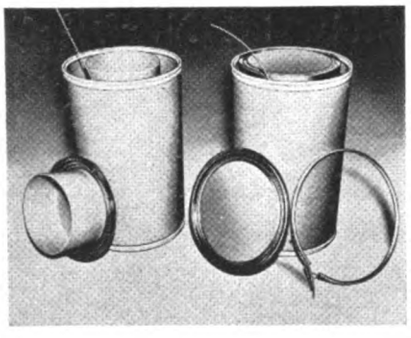
control undercut, weld shape and size. *Welding Dept., General Electric, Dept. RLC, Schenectady 5, N. Y.*



Powered Threading

The 4PJ, a 2½ to 4-in. geared pipe threader, is now equipped with an automatic drive kick-out to make it jamproof. This model is said to make threading with power drives as safe as by hand. Die stock and power drive no longer have to be watched while threading.

After each standard length thread is cut, the drive pinion kicks out automatically and prevents jamming. Gears are fully enclosed and there are no bushings to contend with. An easy-to-set workholder is included with the geared threader. *Ridge Tool Co., Dept. RLC, Elyria, Ohio.*



Welding Wire Dispenser

These Payoffpaks for dispensing automatic welding wire are light in weight and protect the wire contents against coil distortion or corrosion. The dispenser offers the advantages of continuous welding up to 500 lb of deposited weld metal with no down-time or replacing of small coils or reels. According to the manufacturer, the wire feeds steadily from the container, giving uniformity of feed which is essential for submerged arc or inert gas automatic welding.

Welding wire, in size from ⅛ in. to 0.030 in., is available in the package dispenser. They include all analyses from Armco Pure Iron up to 1.10 carbon steel and in low-alloy types and specialties. *Page Steel & Wire Division, American Chain & Cable Co., Dept. RLC, Monessen, Pa.*

Way Wipers

The C/R way wiper is quickly installed on milling machines, shapers, grinders, planers, gear cutters, hydraulic rams, etc., providing protection wherever metal parts slide over ways in close alignment. It wipes the ways clean of all dirt, chips, abrasives, cutting compounds and water emulsions and leaves a thin protective oil film.

The wipers are made in four types, each incorporating a basic synthetic rubber wiping member. Type A is spring-loaded and is enclosed in a metal case. Type B has a metal strip bonded to the rubber. Type C is of plain rubber while type D employs a bonded finger spring. All types are 22 in. long and are easily cut to required lengths. *Sirvene Division, Chicago Rawhide Manufacturing Company, Dept. RLC, 1267 Elston avenue, Chicago 22.*

Air Grinder

A lightweight 6-in. air grinder, with a motor reported 50 per cent more powerful than previous models, is being produced in 12 models—four different speeds and three different throttle types. It has a five-blade type motor with a one-piece rotor and shaft and is available in speeds of 4,500, 6,000, 9,000 and 12,000 rpm. This tool is stocked in butterfly, grip and lever type throttles. The newly designed governor is a unit assembly, direct acting and tamper-proof with an adjustable governor spring.

The 4GG series grip type has a handle integral with the cylinder housing and a steel ball throttle valve. The 4GL series lever throttle handle is made of aluminum with a rubber sleeve. The 4GB series button or butterfly type has an aluminum handle with longitudinal ridgings. Throttle valve seats in steel bushings are made of stainless steel to prevent rusting. All throttle types have a steel reducer bushing for hose connections. The grip type also has an automatic mist type lubricator. *Thor Power Tool Co., Dept. RLC, Aurora, Ill.*

Emergency Lighting

An emergency lighting unit, which not only operates automatically during power failures, but also resets itself is announced. Called a Model A Exide Lightguard, it is said to provide more blackout protection than other types because of an automatic charging device.

Immediately following an emergency discharge, the unit recharges its storage batteries at a high rate. After the high rate charge, it returns the batteries to a trickle rate to maintain itself in constant readiness. A relay eliminates the need for a charge-rate switch, which would require manual operation.

This unit will illuminate one 25-watt sealed-beam lamp for eight hours, two 25's for over three hours, or three such lamps for one and a half hours. Batteries are encased in molded, transparent plastic and the case of this model is 20-guage steel. Finish is baked gray hammertone enamel and the unit, with one lamp mounted on the case, weighs 37 lbs *Exide Industrial Div., The Electric Storage Battery Co., Dept AL—RLC, Box 8109, Philadelphia 1.*

Bonding Rubber to Metal

The Duolock system combines a primer with appropriate tie coats. It may be used on motor mounts, industrial tires, rubber covered rolls, or wherever natural or synthetic rubber is bonded to metal.

It is said that good bonds may be obtained over a wide range of curing conditions such as long low temperature cures or short high temperature cures. Its standard tie coats will do the job, although special tie coats can be developed for volume requirements.

Duolock primer is a free flowing, single phase, black liquid supplied at a viscosity

(*Continued on page 70*)

ASSOCIATION
OF AMERICAN
RAILROADS

Rx

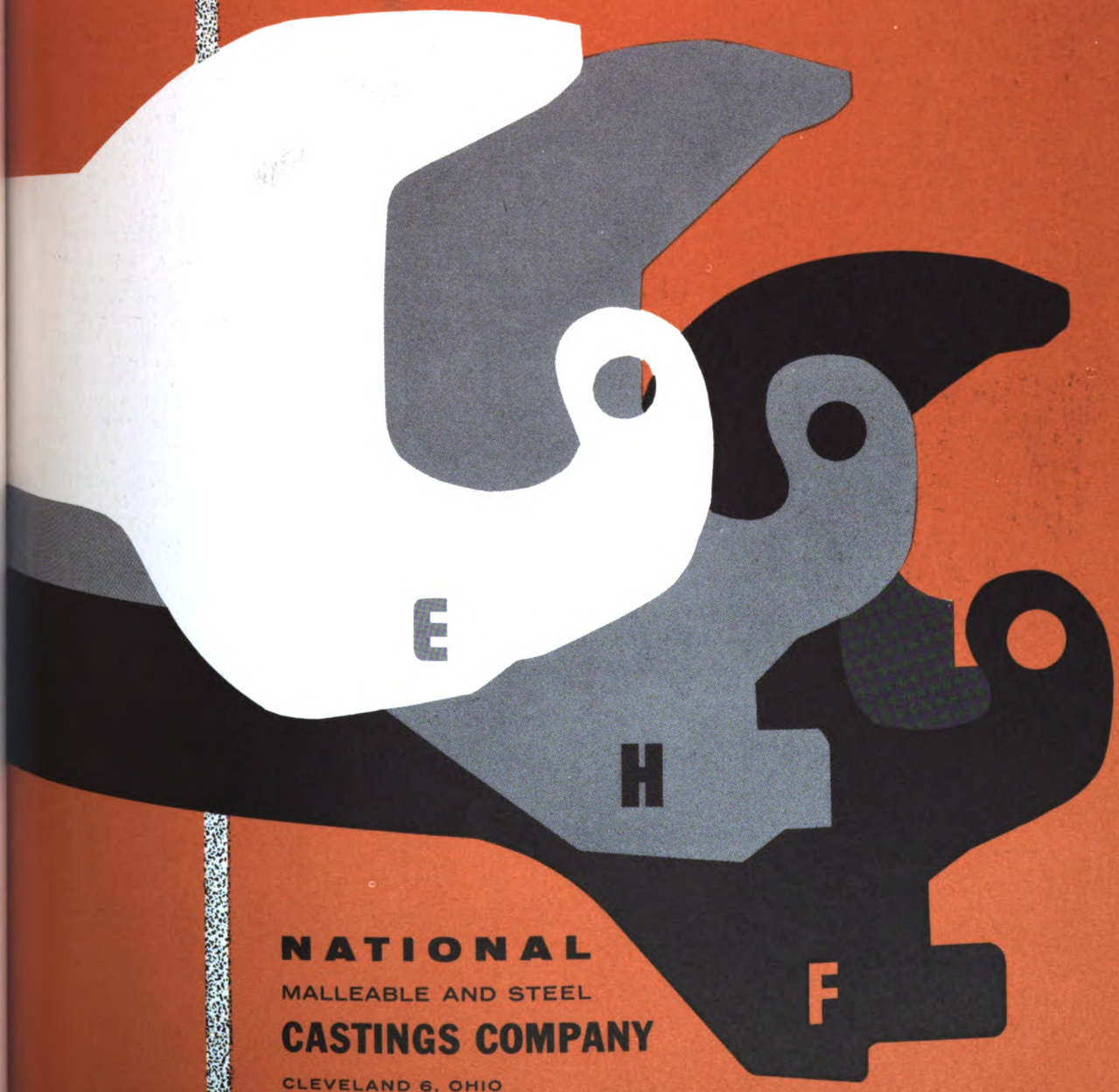
Prescription

Must be of material to specification

Must be cast and fitted to close tolerances

Must have complete interchangeability of all parts

Must be sold at a reasonable price



NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
CLEVELAND 6, OHIO

A standard coupler was needed

Small freight cars or large, small locomotives or mighty, all woul
out some way to join them together; thus, we find the history o
automatic coupler most interesting. Many years have passed s
pin, the Miller Hook and the first coupler of Eli Janney.

So frightful were the accidents of coupling and uncoupling with
pin method that in 1893 Congress passed the Safety Appliance
it mandatory that after January 1, 1898, all cars used in interstat
be equipped with couplers which would couple automatically or
couple without a man stepping between the cars.

While the federal statute saved countless limbs and lives, yet it p
roads a tremendous problem, in that soon there were over 100
couplers, knuckles, locks, and parts.

Finally, in 1916, the Type "D" Coupler was adopted as standar
the United States, Canada and Mexico. With the adoption of a st
soon became evident that a set of specifications would be nee
material, tolerances and so forth. In 1918, the Association of Ar
set up the first specifications on the manufacture and inspection

A comprehensive inspection and gauging program, to assure
highest quality couplers, is conducted by the coupler manufactur
with the A.A.R. specifications. Also, the coupler manufacturers pe
jointly in an extensive program consisting of complete inspectio
change and testing of "E", "F" and "H" couplers.

These A.A.R. specifications, revised and expanded from time t
total of 133 gauges for the three couplers — "E", "F" and "H"
gauging points.

National is proud to have played, and to continue to play, an i
the development of modern railroad couplers, and will continue
low the inspection and gauging specifications set down by th
American Railroads.

NATIONAL DRAW GEAR F

with National
Rubber-Cushione

5
21

TYPE "

In
co

The Type "F
"E". It is als
factor is the
type coupler

National, wi
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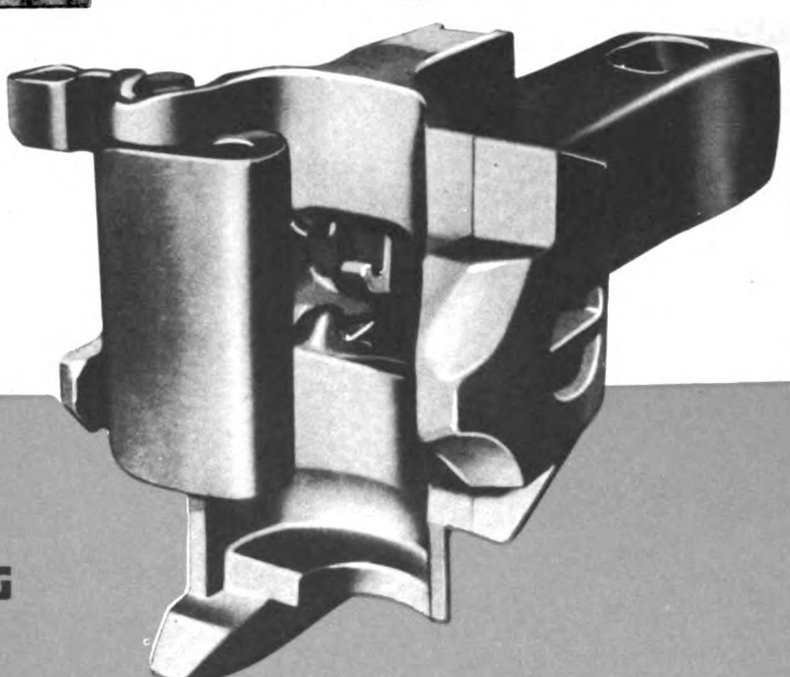
of the railro

50 GAUGES
214 GAUGING POINTS



TYPE "F" INTERLOCKING COUPLER

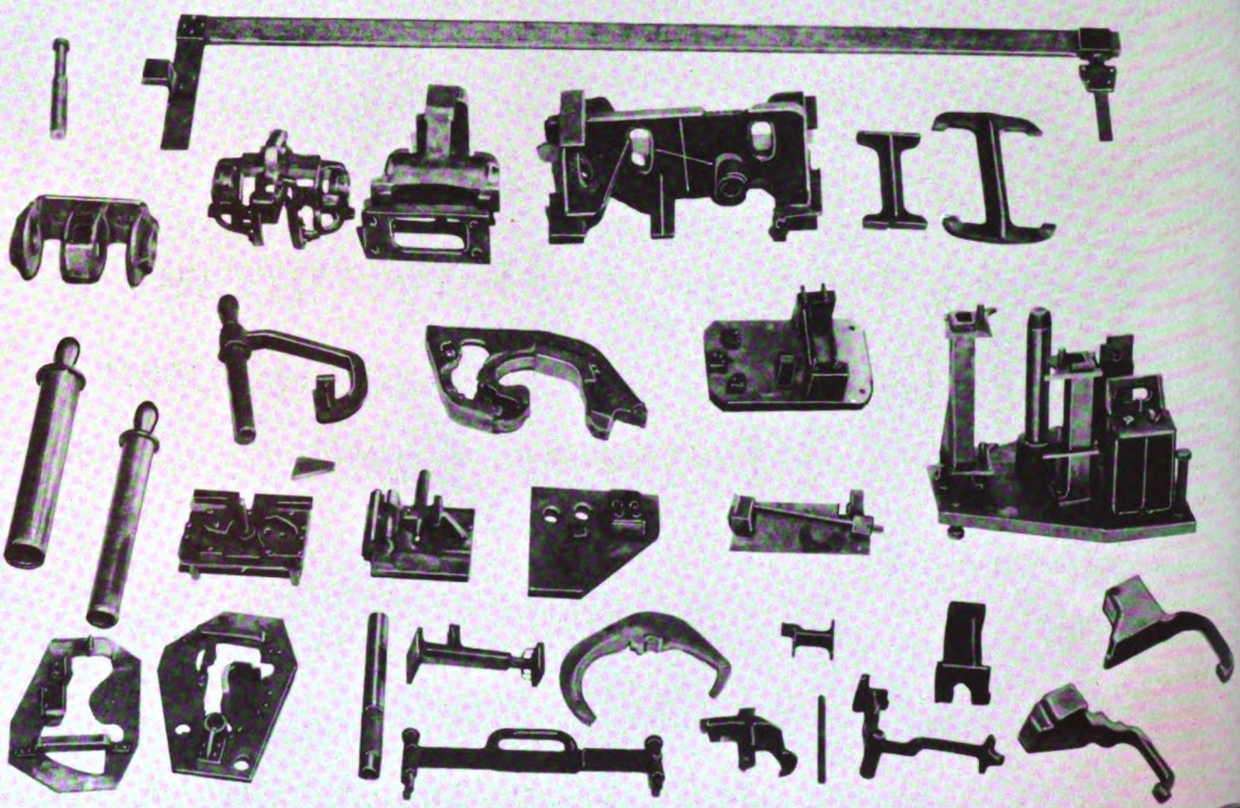
The Type "F" coupler reduces the free slack between knuckles to about 50 per cent of that in the "E". It is also stronger than the type "E" and has interlocking wings for alignment. Another safety factor is the centrally located shelf on the lower front face which serves to support a conventional type coupler in event of a pull out.

National, with over 65 years experience in coupler design and manufacture, contributed heavily to the development of the Type "F" coupler. This coupler was designed for freight service at the request of the railroads after the Type "H" Tightlock coupler proved so successful in passenger service.

RAILWAY DIVISION SALES
CHICAGO CLEVELAND NEW YORK PHILADELPHIA RICHMOND SAN FRANCISCO ST. LOUIS

INTERNATIONAL DIVISION 10600 Quincy Avenue, Cleveland 6, Ohio
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY of CANADA, Ltd. Toronto 1, Ontario

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

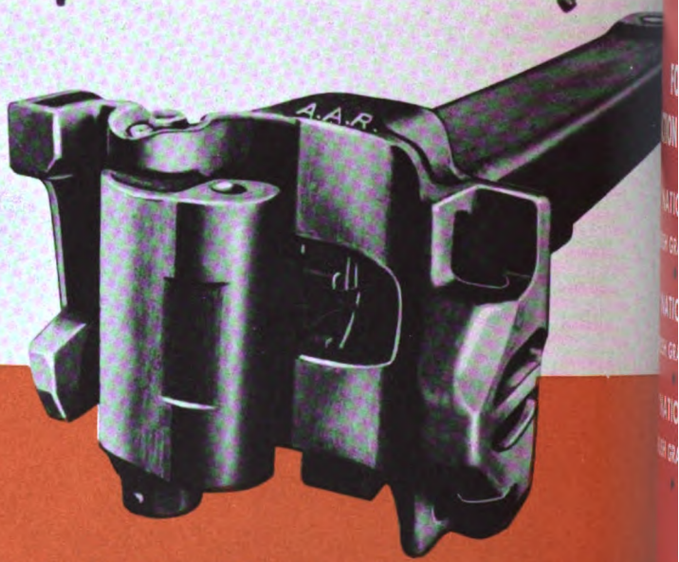


TYPE "H" TIGHTLOCK COUPLER

36 GAUGES

167 GAUGING POINTS

10 MACHINING OPERATIONS TO CLOSE TOLERANCES



Introduced to the railroads in 1936, the Tightlock coup for passenger car service quickly proved itself to be o of the greatest safety factors ever used by the railroa In addition, the elimination of free slack between t knuckles made for greater passenger comfort than w heretofore possible.

National is proud to have been the largest contributor the development of this coupler.

Why NATIONAL TRADE-MARK brushes are

APPROVED

by leading manufacturers of diesel-electric locomotives

"National" carbon brushes assure *top performance* and *economy*. This is due to a continuing railroad-brush-development program, in cooperation with leading locomotive manufacturers, which has resulted in much longer brush life and improved commutator condition in actual railroad operation.

You can save time and money with approved "National" brushes. That's why more of them are used on diesel-electric locomotives than all other makes combined!

HERE THEY ARE:

FOR TRACTION MOTORS

"NATIONAL"
BRUSH GRADE DE-5

"NATIONAL"
BRUSH GRADE DE-3

"NATIONAL"
BRUSH GRADE AZY

FOR MAIN GENERATORS

"NATIONAL"
BRUSH GRADE DE-2

"NATIONAL"
BRUSH GRADE SA-3590

"NATIONAL"
BRUSH GRADE 255

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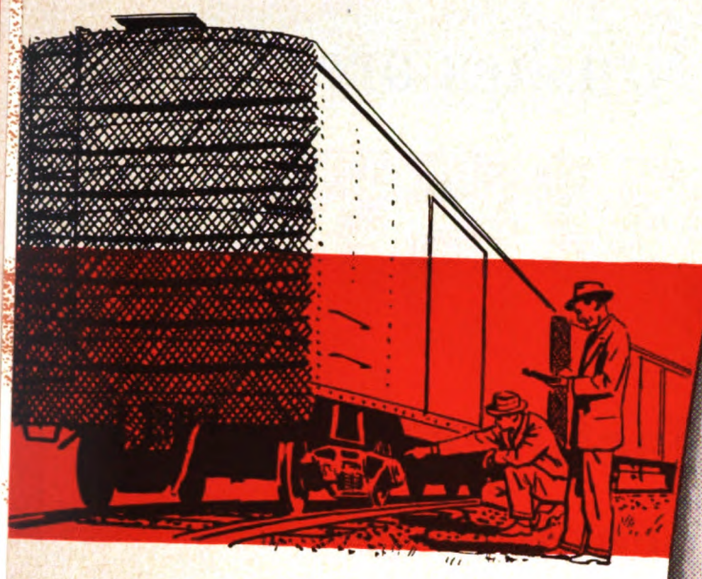
Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto



1953 to 1956

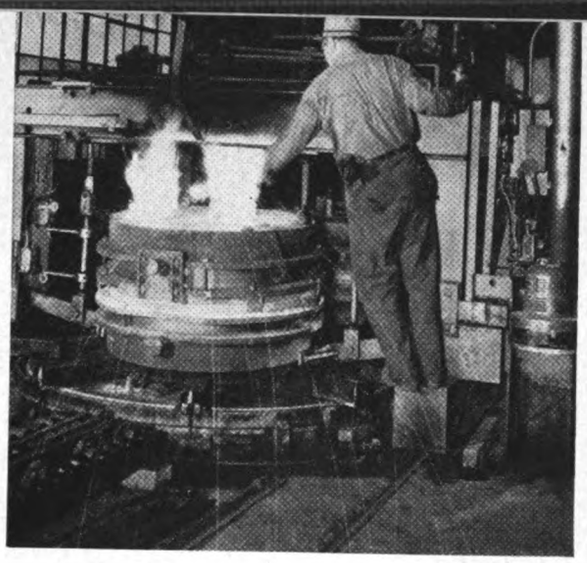
Griffin EQS is placed in service under all types of cars and performance is so outstanding that the railroads move to adopt it as standard.

GEARED TO PROGRESS
RPI MEMBER

GRIFFIN EQS

ELECTRIC QUALITY STEEL

Griffin Wheel Company
445 N. Sacramento Blvd., Chicago 12
In Canada: GRIFFIN STEEL FOUNDRIES, LTD., St. Hyacinthe, Quebec
Plants strategically located to serve all railroads



1952

Griffin announces an entirely new concept of producing freight car wheels . . . a steel wheel, pressure-poured in precision graphite molds to fine tolerances.

1957

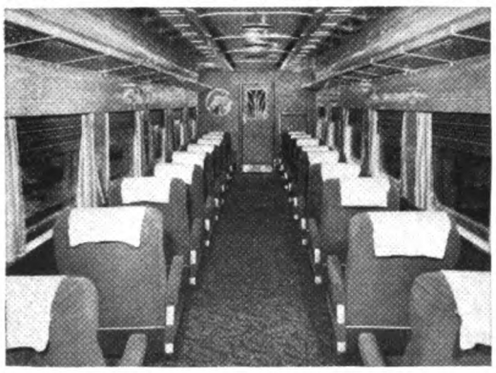
Griffin EQS...now approved as

AAR STANDARD

Effective March 1, 1957

Give the "green" to ***GRIFFIN*** *and watch your costs go down!*

It takes **Adlake** hardware to harmonize with modern car interiors. Attractive yet practical! You'll accent



modern design with the **Adlake** line! Consider, for example: an **Adlake** ash receptacle. Or look at the modern lines of an **Adlake** coat and hat hook . . . the engraved **Adlake** service plate . . . or even the durable **Adlake** used towel receptacle. All are good functionally and are smart in appearance.

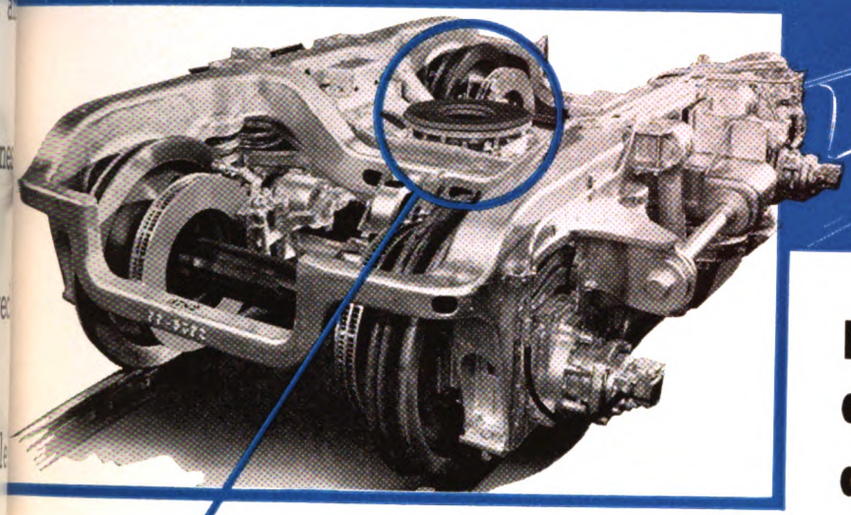
You'll find these, as well as the rest of the complete line of Adlake hardware, in good taste, of top quality and, therefore, most economical in service. Write us, today, for our catalog on hardware for railroad cars. No obligation, of course. Address: 1152 N. Michigan, Elkhart, Indiana.

Adlake
THE ADAMS & WESTLAKE CO.
100th ANNIVERSARY
1857-1957

THE Adams & Westlake COMPANY

Established 1857 • ELKHART, INDIANA • New York • Chicago • Manufacturers of ADLAKE Specialties and Equipment for the Railroad Industry.

Passengers buy riding comfort...



provide
a more comfortable ride
and increase your revenue

with Commonwealth Central Bearings

- **eliminate lateral shimmy**
- **increase wheel mileage**
- **reduce operating costs**

for existing or new equipment

Now . . . a dynamic development that goes after increased revenue with the benefits rail passengers are looking for! Passengers buy *comfort* . . . and you can give them more of it with *Central Bearings*.

Central Bearings offer a simple, positive way to provide smoother, more comfortable riding of *existing* passenger cars, and the best in travel comfort for your new equipment. They have proven themselves on hundreds of cars . . . and are on order for many more.

Truck shimmy and side bearing problems are eliminated by *Central Bearings*. Mileage between wheel turnings is greatly increased and cost reduced. Specify them for your new equipment. Apply them now to your existing cars at surprising low costs . . . sell the new comfort . . . and watch passenger volume grow!

**Central Bearings* occupy the space formerly used by center plates. They eliminate side bearings and require no lubrication. Available in a simple, easy-to-install "package", so they may readily be applied to existing cars.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. EDDYSTONE, PA.

GEARED TO PROGRESS
MEMBER

Rebuilding piston crowns by sigma welding in a matter of minutes saves approximately 70% of new piston cost.

Rebuilding a Titan's Crown...

By Sigma Welding

Because it delivers increased horsepower faster and more efficiently than a steam boiler, the diesel engine has become a mighty and hard-working titan on the American right of way. But diesel economy and efficiency depend largely on maximum engine compression. Sigma welding is helping railroads maintain this vital compression efficiency by making it routine shop work to build up piston crowns and replace piston carriers—at savings up to 70 per cent of new part cost.

Sigma welding's combination of automatic wire feed and argon gas shielding is simplifying and speeding a wide range of jobs in shops across the nation. The sigma process joins all commercially fabricated metals, and attains speeds of more than 100 inches per minute in many operations. Both manual and automatic mechanized installations are easy to operate and maintain.

Learn how railroads are making greater savings than ever before with LINDE's modern methods for joining metals. Call your local LINDE representative today.

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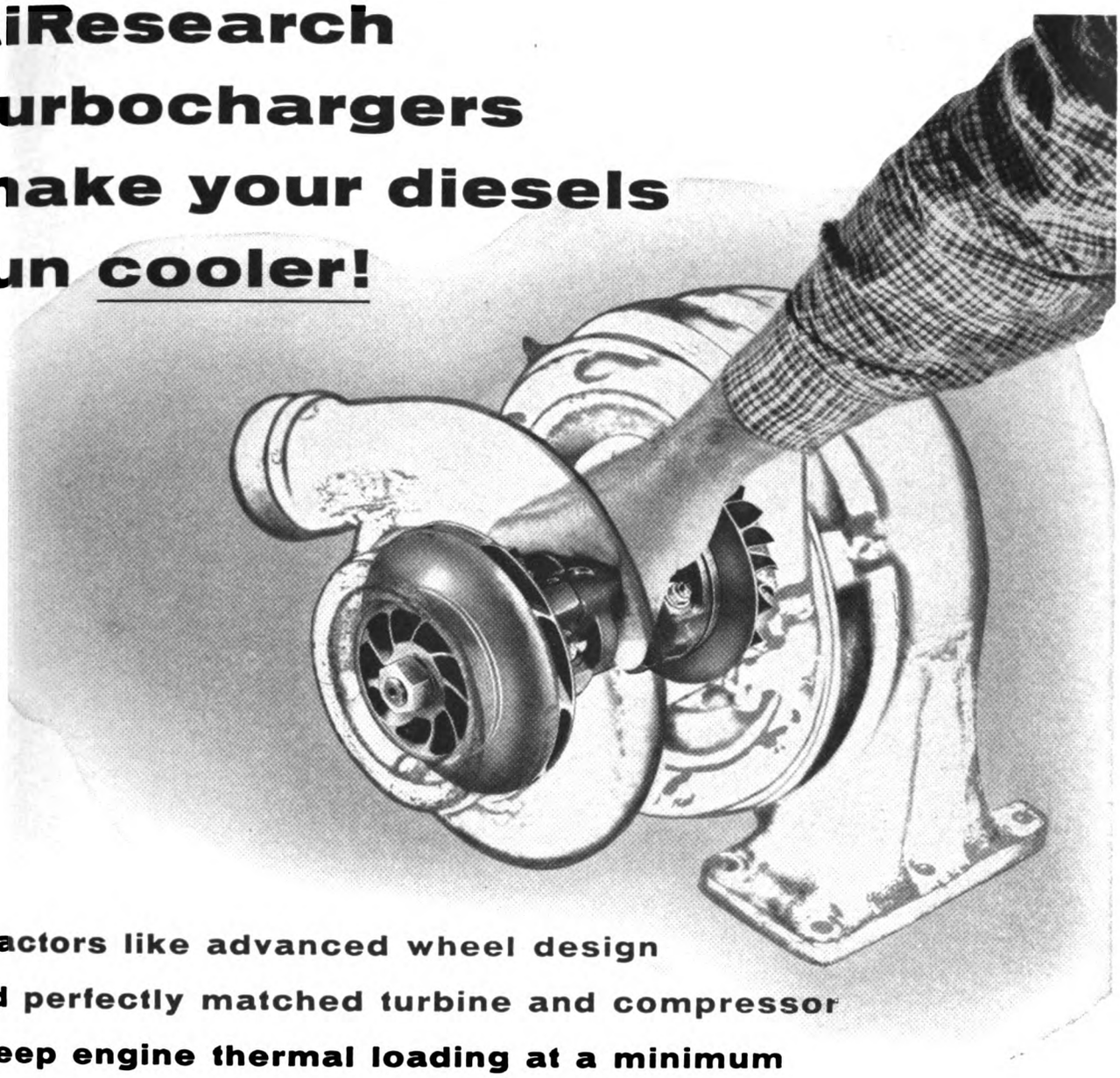
Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .

AiResearch Turbochargers make your diesels run cooler!



Factors like advanced wheel design and perfectly matched turbine and compressor keep engine thermal loading at a minimum

So effective is the AiResearch turbocharger that it provides power gains while actually lowering the heat level of the engine.

Ambient air is compressed with an efficiency as high as 82%, feeding a maximum weight of air into the cylinders at the lowest possible temperature.

Results: maximum power gain at minimum fuel cost; complete combustion with elimination of objectionable smoking; low engine thermal loading insuring long, trouble-free operation.

All AiResearch turbochargers are air cooled, placing no added burden on the diesel cooling system and requiring no complicated plumbing. The rotating assembly is removable as a unit, simplifying in-the-field maintenance. This advanced design evolved from the most extensive experience in the field of small turbomachinery in America.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter — in. nom.	9	11.5	15.25	15.25	16
Length — in.	9	14.12	16.75	17.25	21.75
Weight — lb.	40	95	125	135	195
Output — lb/min. (Standard Conditions)	25-40	35-65	35-65	70-95	115-175

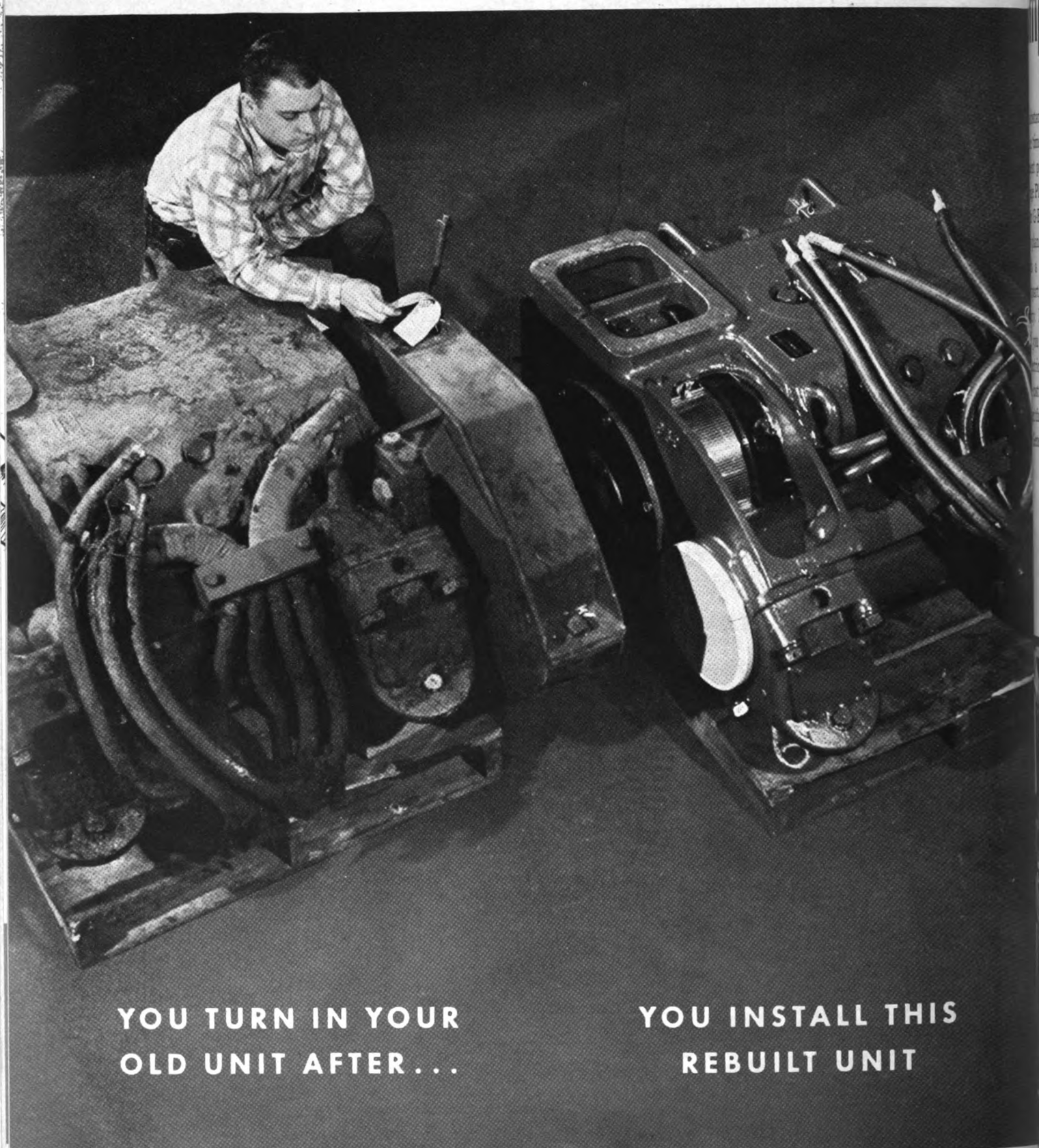
THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

How General Electric's Unit Exchange



YOU CAN ORDER a completely reconditioned key locomotive part from General Electric, install it quickly yourself, and later, turn in your worn part for substantial dollar credits with General Electric's Unit Exchange Plan. You get speed when you need it.

Plan Gives You Quick, Low Cost Major Component Replacement Service

You can substantially reduce your locomotive out-of-service time and the high costs of stocking key component parts by using General Electric's Unit Exchange Plan to replace key electric components in your G-E equipped locomotives.

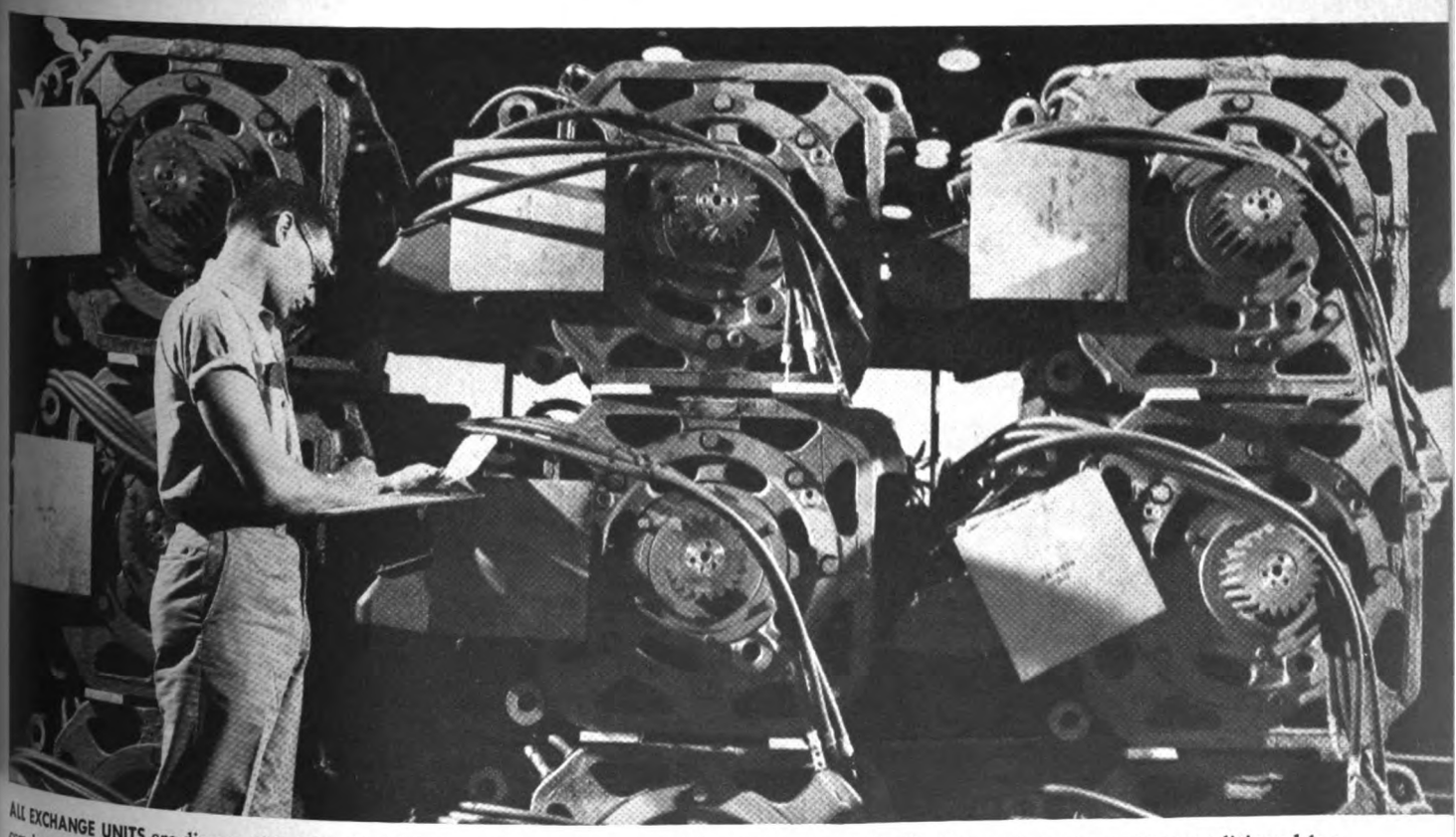
With this plan, you replace a work-worn component with a completely reconditioned G-E replacement part. This "like new" part has a new-part warranty. Later, when you've made the installation, you turn in the worn component to General Electric for substantial dollar credits toward the cost of the Unit Exchange Service.

You can get this service quickly—when you need it—because General Electric maintains high stock levels of all key G-E locomotive components at Parts Centers located across the country. And by letting General Electric stock and supply your key parts on an exchange basis, you free your shop space and personnel for more productive service.

General Electric's Unit Exchange Plan applies to a wide range of major electric components in your G-E equipped locomotives. For complete information on how this plan can best work for you, contact your nearest G-E Parts Center or your locomotive builder. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 128-31

Progress Is Our Most Important Product

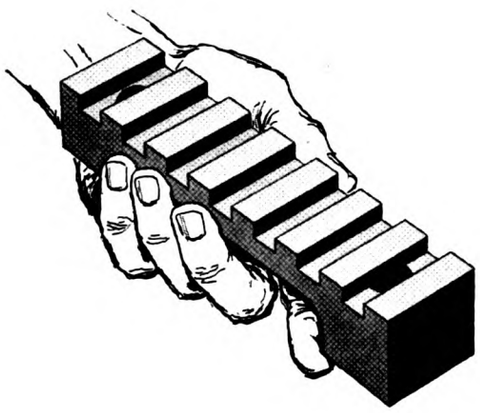
GENERAL ELECTRIC



ALL EXCHANGE UNITS are disassembled for detailed inspection and complete reconditioning before they are returned to the exchange pool for future use. That's why each component reconditioned by General Electric has a new-part warranty.

How R-S JOURNAL STOPS will further Reduce Solid Bearing Operating Costs

and pay for themselves in less than 3 years!



Tests have proved that this new device will greatly improve bearing performance and journal lubrication, will at least double bearing life, reduce wheel flange wear and make other significant savings in freight car operation.

STABILIZE the solid bearing assembly and you approach the maximum in bearing performance. You do just that with R-S Journal Stops. Best of all, they pay for themselves in less than 3 years. Here's how:

First, you reduce routine yard servicing and oiling requirements. Packing seldom needs adjustment, and you don't need oil so often either. (Other lubricators, pad or mechanical, will benefit, too). You cut car oilers' time in half, and inspectors' time by as much as 25%. When enough cars are Journal Stop equipped that could mean savings close to $18.00 per car per year.*

Second, all indications point to 3-year periods between periodic attention as required by Rule 66. That would cut current costs in half — save as much as $6.00 per car per year.

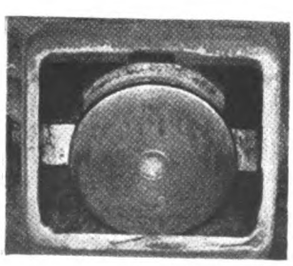
Third, and conservatively, you'll reduce road repair costs to a third of what they now are — possibly a great deal more. That means minimum savings of $6.00 per car per year.

Fourth, you'll cut bearing consumption in half — use less than 1½ bearings per car per year. In annual savings that will mean about $4.00 per car.

The above four items alone represent potential annual savings of $34.00 per car. Add to these the tremendous savings due to reduced wheel flange wear and a 3-year recovery estimate is probably conservative.

One private car company whose total savings are determined largely by billings that don't cover servicing costs, has already estimated recovery of total installation costs in less than 3 years. Operating roads will save even more. Write us today for full information. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

**These and other estimated savings are based on unbiased studies of AAR solid journal bearing operating costs.*



Unretouched photo of the RS Journal Stop installation with conventional waste packing. Other lubricators are similarly "contained."

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

Modern Cars Use Plywood

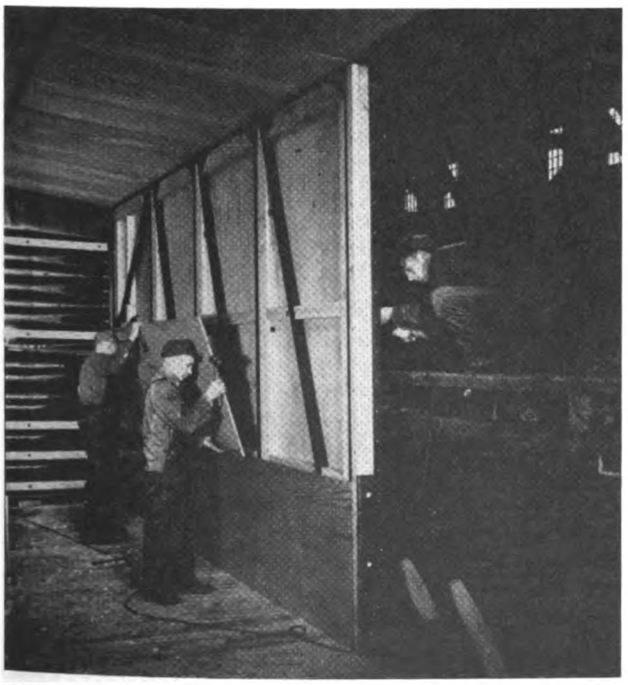
...for a variety of applications, both interior and exterior. Plywood has some disadvantages—most of which can be overcome by proper techniques

Today there are some 50,000 all or part plywood freight cars in service on 25 U.S. roads, in which plywood is used either as an internal or external construction material. It has been tried out from time to time on different roads with varying degrees of success since it was first applied in 1936 as a ½-in. ceiling for box cars, and shortly thereafter to the interior sides and ends of 1,000 furniture cars. Currently the principal uses of plywood for rolling stock appear to be in five general categories:

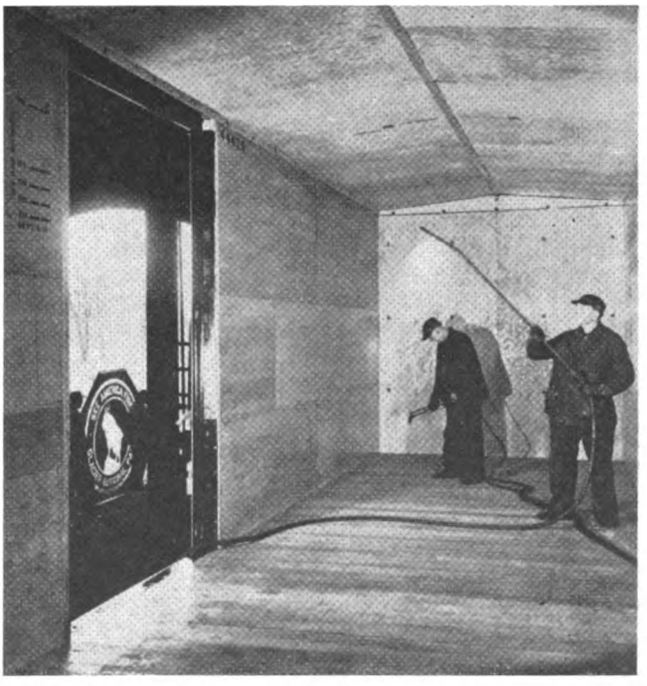
1—Box car lining and relining
2—Interiors of refrigerator cars
3—Freight car sheathing renewal
4—Caboose and camp car rehabilitation
5—Passenger car interiors

Cost is not a governing factor in comparing plywood against tongue and groove (T-G) lumber for either inside lining or outside sheathing. The extra cost of buying plywood is just about made up by the saving in labor to apply it. Material cost may run half again as much as with other lumber, but the reduction in application cost about cancels this increase out.

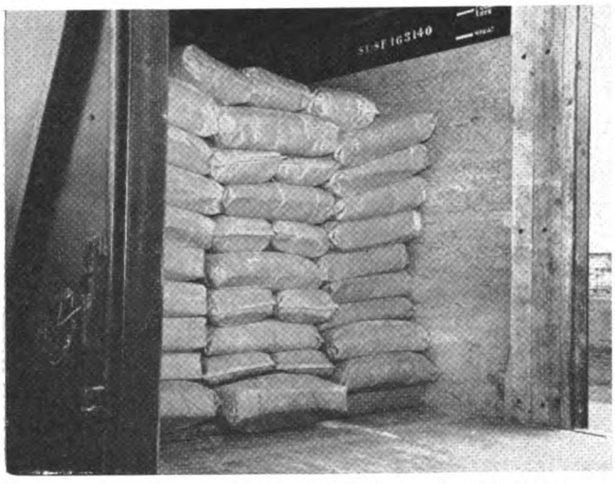
On one repair program where plywood was used on both the inside and outside, the cost per car ran around $127. This was $10.00 more than conventional tongue and groove siding, but the labor cost for application was $8.00 less—a net



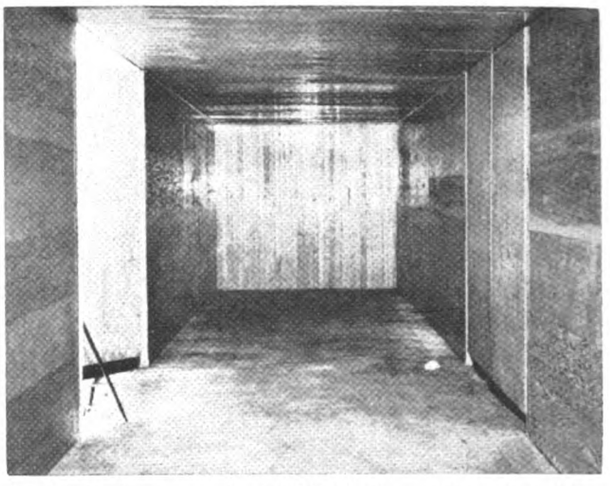
Exterior grade ⅝-in. fir plywood was used both for interior lining and exterior sheathing on 1,000 Great Northern box cars in a rebuilding program.



Interior of one of the Great Northern box cars after completion shown while the lining is being treated with a spray coat which is a moisture repellent.



Cars rehabilitated by the Frisco for handling only foodstuffs have a number of features to protect bagged commodities, including plywood side lining, smooth-finished flooring, and rounded-off door posts.



"Cookie Box" cars on the D&RGW built specially to keep bakery goods fresh and painted white on the outside have ¼-in. plywood in the sides and ceilngs and ½-in. plywood for the lining of the doors.

increase of only $2.00 (The actual difference amounted to a little more than this $2.00 because some additional lumber had to be used to revise the framing to convert the car exterior from conventional lumber to plywood, but the total was still in the $5-$10 range).

Since the total initial cost of plywood, considering both materials and labor, is not substantially higher than conventional T-G lumber there must be other factors not readily apparent that to be weighed in deciding for or against plywood. Based on results on 11 railroads, here is an evaluation of the advantages and disadvantages of plywood in different services.

Nailing a Major Problem

The inability to stand nails is one of plywood's principal problems. In regular lumber, nail holes tend to close up when the nail is removed, especially where the lumber is under compression like the lining of a box car. Not so with plywood—when a nail is removed the hole remains. Thus bulk commodities can leak through the hole and out of the car. In some cases moisture will leak into the car.

In one group of over 1,000 cars a few years ago the plywood side linings had to be replaced because of such nail holes. Additional back up strips with "Nail Here" signs in front of the strips were not enough to keep people from driving nails where there was nothing behind the plywood. After a few trips in which nails were used to secure lading enough holes remained to render the cars unsuitable for bulk lading and to require replacement of the lining.

Another weakness of plywood is that the sheets tend to buckle, apparently from dampness. Partially this occurs because the sheets are thinner than standard T-G lumber. Remedying the situation by using thicker sheets is expensive. So too is the use of additional supports to control the buckling.

Plywood has less resistance to damage from lift trucks than regular lumber. Where ordinary wood will often stand a blow without serious damage, plywood chips off a layer at a time.

Some of the disadvantages of Plywood are relatively easy to overcome —but at a cost. An order of cars delivered to the Southern a year ago, with ¾-in. plywood side and end linings is protected against nail holes by lading strap anchors and slots which reduce and perhaps even eliminate the need for nailing. Protection against bumping by lift trucks is attained by a steel plate 4 ft high all around the car. The plate in turn is coated with .015 in. of Neoprene to protect against rust and corrosion and to add some resiliency. The upper portion of the lining is attached by 2-in. screws to three horizontal furring strips to eliminate the possibility of nailing damage and to simplify renewal of any sections that may become damaged in service.

On the plus side, plywood makes as smooth highly desirable interior surface. Fewer joints are required and the danger of infestation is reduced.

For outside sheathing, plywood is considered more durable than conventional T-G lumber and retains an acceptable appearance longer.

Installation Costs Are Less

A further advantage of plywood is that labor savings can be appreciable. One eastern line found that five cars can be re-lined with plywood in the same time two can be re-lined with T-G. Average actual reduction per car was 5½ man-hours. This shop applied the plywood right over the worn-out T-G lining.

In addition to these general advantages, plywood also offers specific advantages for individual uses. In applying ¾-in. exterior grade plywood to interiors of remodeled cabooses, the B&O felt that the improvement in neatness and appeal alone justified the additional cost of plywood due to the effect on morale. The plywood interiors also keep the caboose warmer by reducing heat loss; they are easy to paint; have not been found to warp and are less subject to cracks, splintering and chipping.

Individual roads report additional factors involved in deciding whether to use plywood. One line reported theft as quite a problem—cars would be stripped bare of the lining.

Several lines that use the better grades of plywood (like marine grade) attribute failures on other roads at least partially to the use of cheaper grades. Failures are also attributed, in some instances, to not

using heavy enough sheets at critical locations. To avoid this, one line that uses 7/16-in. plywood for reefer side lining applies 7/8-in. plywood end lining to stand switching shocks better. Another road installs 3/4-in. side lining and 1-in. end lining in box cars. Others find, however, that sheets as light as 3/8 in. are satisfactory for side lining where the service will not be severe (food cars, as an example).

Application also affects the life of plywood. One line that uses plywood extensively for reefers experienced trouble with buckling. This was eliminated by leaving 1/16-in. clearance between the edges of the sheets. However, this procedure may not be the complete answer for box cars to be used for bulk loading, where the buckling force is far greater. An additional factor thought to help prevent buckling is the nailing practice—nails are applied and driven consecutively from one side to the other.

How Repair Problems Compare

It may seem at first that one of plywood's advantages may be greater ease of repairing damaged sections due to the absence of the interlocking tongue and groove. Lack of support along the joint of the renewed portion is generally considered to make it impractical to replace small damaged sections. This may be a major reason why a number of lines like plywood for refrigerator cars (where physical damage is small) but not for cars subject to damage from lift trucks, nailing or heavy bulk loads. This is also the reason several lines want metal protection plates around all wooden linings, plywood or not.

The new plastic upgrading materials may help plywood's future by reducing the repair problem in one of two ways. One way is by making it easier to repair small damaged sections. This would remove one of plywood's relative disadvantages.

The second way that plastic upgraders can help plywood is as an initial application to new linings. In other words, use the plastic coating to *prevent damage* from occuring rather than to *repair damage* that has occurred. (The coating would of course offer the same advantage for standard lining—thus it is a question which receives the greater relative benefit). This is being done on truck trailers where, for $100 worth of material and 12 man-hours of labor, the floor, sides, ends and ceiling are covered. The procedure is expected to increase the life of the plywood two to four times.

So far as is known, this practice is not being followed in freight cars with plywood lining. However, the Union Pacific has done something similar on conventially lined box cars. Instead of using upgrader materials to patch up damage, the UP applies the coating to cars with fair to good lining to increase its life. The cost to cover the complete car interior (floor, sides and ends) runs around $200 for material and $100 for labor.

The Great Northern is one of the more extensive users of plywood—both to the inside and outside of cars in repair programs. The GN has also used plywood in new car construction, (2,000 cars between 1944 and 1947). However, once steel became readily obtainable, the use of plywood externally was discontinued in favor of steel.

But the question remained as to what to do to repair some 8,000 existing 50-ton cars with 25/32-in. tongue-and-groove sheathing bought from various builders between 1937 and 1942. To compare plywood with standard T-G exterior siding, field examinations were made of the condition of the road's 1944 plywood cars and of the condition of conventional-siding cars of the same age.

From these surveys, GN officers considered that the plywood cars seemed more durable and kept their good appearance longer. Hence, the

Some roads have used jigs to mark the spots in plywood panels where nails will be driven. This procedure insures even nailing during panel application.

Side lining of the MP general service box car is applied with panels horizontal and 2-in. space above the floor.

Plywood was used for the ceiling, lining, and sub-floor of twenty Texas & Pacific insulated Evans DF box cars.

company initiated a general repair program on 500 cars using 5/8-in. vertical plywood as outside sheathing. Later, a second program was undertaken with the plywood sheets being applied horizontally for comparison. The horizontal application was considered better for this job because (1) eight over-sized panels substituted for 16 vertical sheets; (2) less re-framing was needed; (3) the finished car looked better; (4) the car was strengthened longitudinally.

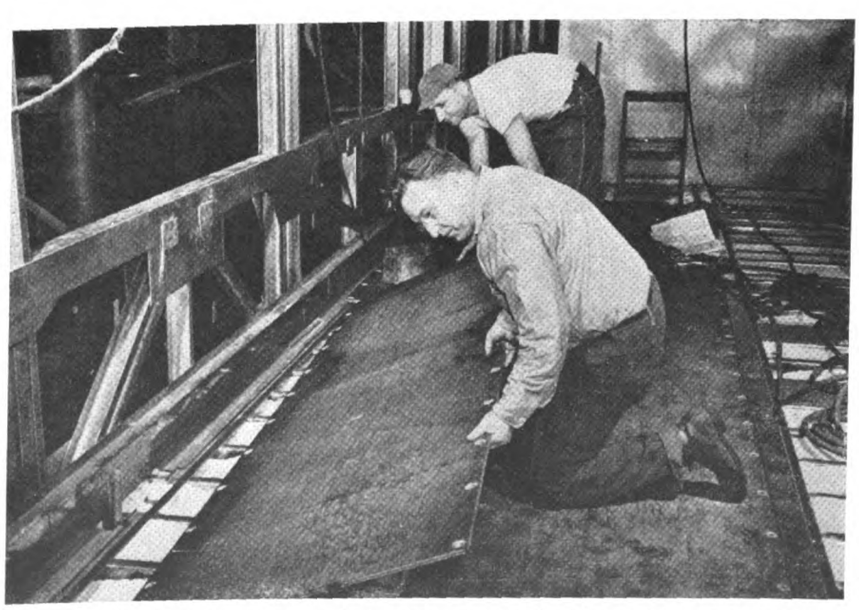
The Frisco last year upgraded 235 wooden box cars by applying steel sides and 3/8-in. exterior grade plywood side lining. The 40-ft cars after rehabilitation will handle only edible foodstuffs like sacks of flour, powdered milk, rice and beans.

Handling food is the duty of another group of plywood-lined cars—those on the D&RGW which has 35 "cookie box" cars for transporting bakery goods. These are 40-ft cars with 3/4-in. insulation in the side walls, ends, ceiling and doors.

The sides and ceilings are 1/4-in. plywood, the door lining 1/2-in. plywood. Ends are conventional T-G.

Installation time for the application of the plywood lining is eight man-hours, including painting time for two coats of clear sealer on the interior. Cost of the plywood is about $122.00 per unit.

In rebuilding the interiors of cabooses, eight sheets of plywood 4-ft by 8-ft substituted for 100 pieces of T-G in lining the sides—half in 24-ft lengths and half in 8-ft lengths.



Plywood subfloor and side wall lining is an accepted part of modern passenger car construction. Above is Burlington Zephyr car which is being completed at the Budd plant.

Insulated Food Cars

Another type car in which plywood has been used recently is the insulated box car. The T & P built 20 such cars last year to prevent "sweating" when the temperature warms up a cold shipment and to prevent freezing of the lading when it turns cold. These cars have plywood ceiling and lining, and a 3/4-in. sub-floor of plywood.

These cars are insulated like refrigerator cars and equipped with Evans DF lading-protection equipment like box cars. The DF equipment includes steel belt rails to anchor the bulkhead cross members and wood rub rails approximately flush with the edges of the steel rails to protect the merchandise from the otherwise protruding belt rails. The cars have special air-tight refrigerator-type doors with 3-in. insulation which slide and clamp tight.

Aluminum paint is used throughout on the interiors of the cars for good light reflection. The exterior is coated with yellow paint, sprayed hot to dry rapidly so that the car is ready for the second coat by the time the first coat is completed.

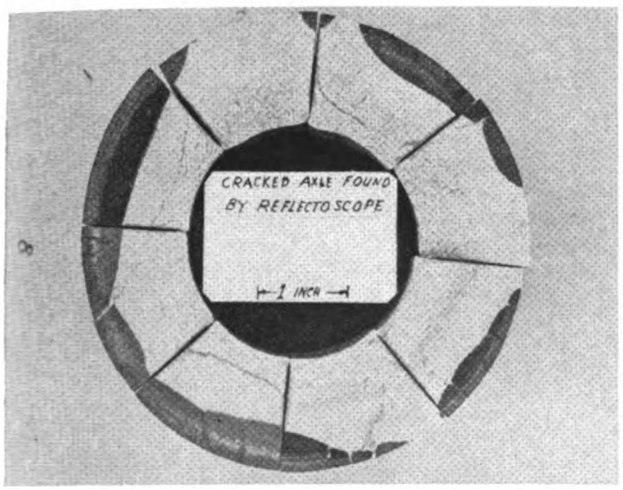
The Missouri Pacific uses heavy plywood to line new box cars, presumably because they are used in general service and therefore subject to more abuse than some of the special service cars referred to previously.

The MoPac uses 3/4-in. plywood for side lining and 1-in. for end lining. Both have an 11/16-in. groove into which is inserted a metal spline. Used in between each plywood sheet, this spline affords a strong and attractive plywood wall siding.

The bottom row of side lining consists of fir plywood sheets 26-in. high which are nailed to provide a 2-in. space above the floor decking. End linings are secured with no open space. All panels are applied horizontally.

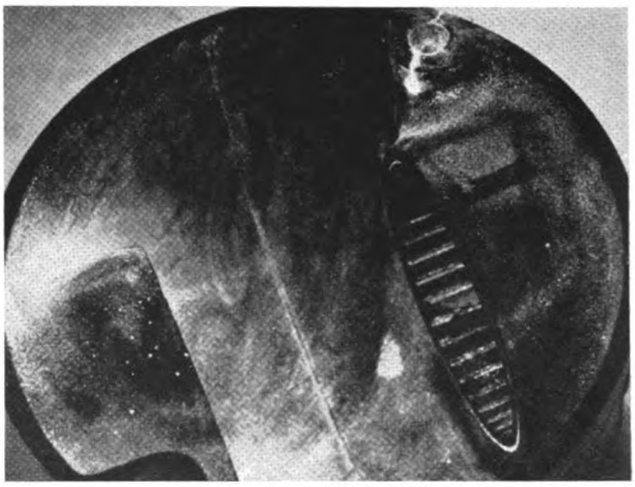
The MoPac estimates that the plywood cost for both the side and end lining in a 40 1/2-ft car is approximately $204. Labor costs for the same car will amount to approximately $13.

FREIGHT CAR AXLE . . .



Reflectoscope indicated freight car axle flaw, and depth is indicated here.

DIESEL PISTON CARRIER . . .



Magnaglo inspection was able to detect this flaw in GM diesel piston carrier.

SP Gets To the Heart of Things . . .

Using Non-Destructive Testing

As the use of diesel locomotives increased, there has been need for special kinds of inspection. Diesel valves will not take a satisfactory magnetic test due to high percentage of chromium and nickel. Other methods such as the Zyglo fluorescent penetrant type of non-destructive test have been applied to this problem. Zyglo "Pentrex" fluorescent penetrant inspection is set up for inspection of valves at all major points on the SP where diesel maintenance is performed. The primary concern is checking the used valves at time of engine overhaul to be sure that these important parts are free from heat checks or any defects which would impair the normal service life. Representative new valves are also tested and this practice may be extended to 100 per cent inspection of valves if found necessary. All defect indications in head portion of valves are cause for rejection with exception of the circular mark which appears near the center of head on some valves and is caused by the forging hammer operation. Stellite-faced valves must be carefully inspected to see that there is a good bond and no porosity where the two metals are joined. The lower end of the valve stem is also checked closely and no valves which show defect indications, either longitudinal or transverse, below ½ in. from the upper keeper groove are used. Longitudinal seams up to one inch in length and located more than ½ in. above the upper keeper groove are not considered injurious to service life of the valve. During April, 1956, 723 used valves were inspected at Sacramento shops and 336 or 46.5 per cent rejected.

Diesel Engine Valves Inspected and Found Defective:

	Number inspected	*Number scrapped*
EMD 1500 hp. freight diesels	287	176
ALCO 1000 hp. switchers	90	18
ALCO 2000 hp. passenger diesels	323	133
Baldwin	23	9

Diesel engine parts, made of ferrous materials, can be tested to best advantage with the Magnaglo type of magnetic particle inspection. The connecting rods, fork rod baskets, drawbar pins and similar parts require a longitudinal magnetic field applied continuously with strength about 2000 to 2400 amp. turns. Piston carriers, wrist pins and bearing rollers require a circular field as produced by passing current through the part, or through a hole or opening in the part. Diesel pistons are subject to fatigue flaws at several locations and directions so that both a longitudinal and circular magnetic field must be used to assure complete inspection for all defects.

The tests mentioned thus far are essentially for surface crack detection and examination. For detection of internal flaws, the SP uses radiography with X-rays and with gamma-rays, sonic methods and ultrasonic methods as well as electrical and magnetic field tests which have been applied to rails.

A Sperry Model SR05 ultrasonic reflectoscope, purchased by the SP in 1949, was one of the first used on the Pacific Coast. It has served well for test of driving axles on steam locomotives and to a more limited extent to crankpins. Now a later model equipment suitable for immersion type testing and a tank are being installed in the laboratory at Sacramento for this purpose.

In order to evaluate the ultrasonic inspection of freight car axles, axles

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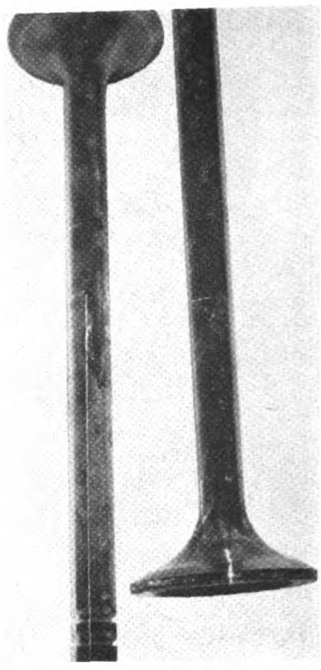
Reported by A. S. Pedrick, asst. eng. of research and mech. stds. at ASTM meeting, Los Angeles.

Radiographic inspection requires special facilities for storage and handling of the radio-active isotope. SP has this installation.



Zyglo inspection revealed these cracks in diesel engine valves.

were tested on all cars as they arrived at Sacramento shops. In 1,000 cars given this test, four cracked axles detected. These axles were checked by magnetic particle inspection to verify the flaws and then cut in segments and broken open to disclose the depth of fracture, as illustrated.

None of the cracked axles gave any surface evidence of overheating and had apparently been functioning in a satisfactory manner up to the time the cracks were discovered by ultrasonic inspection and the axles were then removed from service. The flaws varied in depth from ¼ to ¾ in. and the local high-stress condition set up would eventually cause failure and possible derailment of equipment if continued in service.

A diesel locomotive driving axle was sectioned through locations where several flaws were indicated by the reflectoscope in order that ultrasonic indications could be correlated with actual physical findings. Ultrasonic inspection has been under study by the steel wheel manufacturers as means of preventing shattered rims which sometimes occur in diesel locomotive wheels. This condition is usually caused by laminations or inclusions during the manufacturing process.

The conclusions reached in this study are that the reflectoscope provides an excellent tool for quality control in the production of wrought steel wheels. However, numerous variables are involved—difficulty in estimated size of the discontinuity; effect of orientation of defect; effect of surface finish; blind spots at locations close to the searching crystal; and variations between different instruments.

Thus it is seen that there are some problems to be worked out in applying this inspection to new wheels at manufacturer's plants. Test of used wheels would be much easier since the progressive fatigue fractures looked for in maintenance inspection are relatively large and are visible at the surface, so the maintenance inspection may be performed more effectively by other methods.

X-Ray Inspection Helpful

X-ray type inspection has a definite usefulness on the railroads. Tests similar to this are being performed at the Sacramento laboratory, using gamma rays from radium or from radio-active Cobalt-60. A 5-curie source of Cobalt-60 is available for radiographic inspection purposes, and also a smaller source which at time of purchase in July 1950 had a strength of 620 millicuries.

The 5-curie source must be handled with a good deal of caution. When not in use, it is stored in a pit lined with six inches of concrete and eight inches of lead, and is sealed by a lead plug. A spherical lead container with a six-step conical door provides a beam of radiation in limited area when the capsule is in the container and no exposure to the operator if he remains to the rear of the container. The usual procedure for radiographic test of couplers and yokes is to arrange these parts in a circle with the capsule in the center. X-ray films in cassette envelopes are taped to the back of the parts under test. Lead foil on both sides of film in cassette reduces the amount of exposure required, due to effect of secondary electrons produced in the lead screens by the incident gamma rays.

The exposure required varies according to the distance from the capsule and thickness and character of the metal. A greater distance gives sharper outline of blowholes, cavities, etc., but increases exposure time. A section of steel, 1-in. thick, at a distance of 6 ft requires about 2.5 hrs exposure using a gamma ray source of 6000 milliroentgens. Sometimes two exposures are made at different angles through the part in order to give a better indication

of shape and character of inclusions of foreign material, porosity, blowholes or shrinkage cavities in steel castings.

Black Light Shows Fuel Leaks

A new test which has proved helpful to the railroads is the application of high intensity black light to the problem of finding fuel leaks in diesel engines. Most of the railroad diesel engines have a crankcase capacity of approximately 200 gal. of lubricating oil. Fuel oil leakage into the lubricating oil is one of the most common causes for crankcase oil changes. Fuel oil dilution of 5 per cent is allowed depending on the equipment and type of service. The amount of dilution is indicated by viscosity tests and flash point at control laboratories, but the finding of small leaks or mere seepage of fuel from joints and pipe connections in the engine becomes a difficult problem.

This form of non-destructive test takes advantage of the fluorescent characteristics of fuel oils and lubricating oils. When exposed to black light, lubricating oil appears as an opaque "milky-purple" color. Fuel leaks can then be located by shining high intensity black light on the fuel injectors and fuel oil lines, at the same time having fuel pump in operation so that normal pressure will be present and looking for areas showing purple color. Black light is also helpful in observing the spray pattern of diesel fuel when testing fuel injectors.

A useful non-destructive test will provide reliable measurements or indications that can be correlated with properties of materials or discontinuities which would affect the serviceability of materials, parts, structures or assemblies. Assuming the most effective form of test has been selected for requirements at hand, there is still a problem of training operators so that best results will be obtained with these special tests. The operators must have sufficient understanding of the principles underlying the method used and for proper application of the equipment to make the test most effective. Any testing device or procedure is only as good as the understanding of the people who use it.

An electron microscope is used at the Sacramento laboratory in checking stability characteristics of diesel fuel oil and effectiveness of additives in fuel oil and in lubricating oil. Spectrographs and quantometers have also become quite common in railroad laboratories. The SP has two Applied Research Laboratory spectographs. One is in general use at the Sacramento laboratory for foundry controls and miscellaneous testing on unknowns. The other instrument is at the Los Angeles shop laboratory and is used for checking trace elements in diesel crankcase oil.

Oil and Water Testing

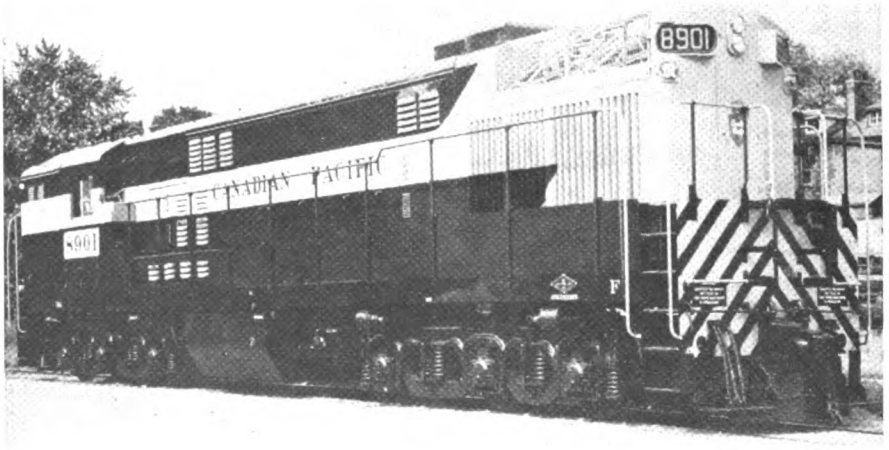
The test of crankcase oil and cooling water from the diesel engines is one of the major activities at the SP laboratories. They have a total of four branch laboratories and a staff of 16 chemists performing this work. This is in addition to a staff of 23 at the Sacramento general laboratory. Oil is drained only when the specified condemning limits have been reached or on judgment of the supervisor in charge in connection with mechanical work on the engines.

Use of the spectrograph has been highly publicized as an oil control and for indication of excessive wear in diesel engines. SP experience with this equipment over a period of several years has not confirmed these advantages. The indications of trace metals are not always representative of engine wear due to sampling errors and other variables, so the results are often misleading. Routine use of the spectrograph on oil samples has been discontinued but this instrument is applied to analyses of engine deposits and other special problems when the need arises.

With further reference to applying non-destructive tests to railroad maintenance, it should be realized that each type of test will reveal only the specific kinds of defects or discontinuities for which it is designed or best adapted. It will not be a cure-all to overcome lack of knowledge as to reason for service failures and specific nature of materials or prevent early fatigue on account of poor design or improper manufacturing practice.

The proper use of non-destructive tests can, however, give additional factual data which is helpful from the standpoint of engineering and design.

CPR "Train Master" Has Wide Hood

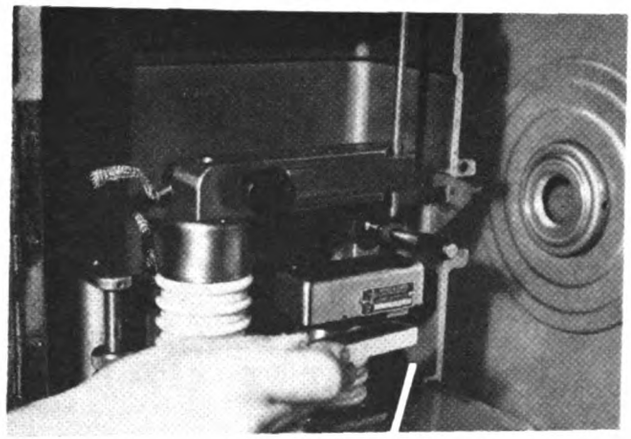


Canadian Pacific got the first production run of twenty Canadian-built "Train Masters". Previously the Canadian Locomotive Company has relied on Fairbanks Morse for most of the components; for these units F-M supplied only engine parts such as crankshafts. Locomotives have General Electric transmission equipment. To make it possible to install two Vapor 4625 steam generators, the hood back of the cab was made full locomotive width on four of these units intended for passenger service. Special fuel tanks have capacity of 1,650 imp. gal.

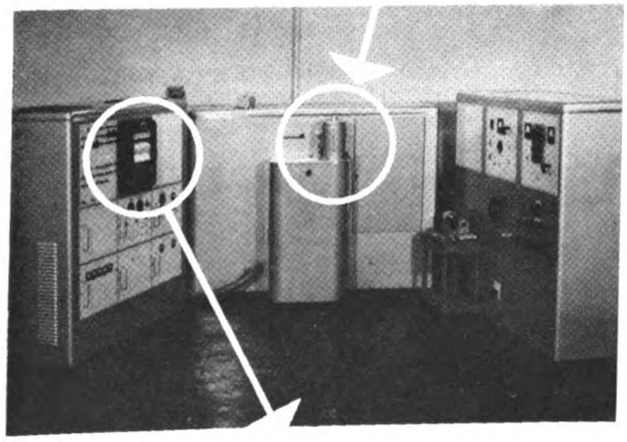
Quantometer Speeds Evaluation of Locomotive Lubricating Oils

By V. C. BARTH,
Assistant Engineer of Tests
Chicago & North Western

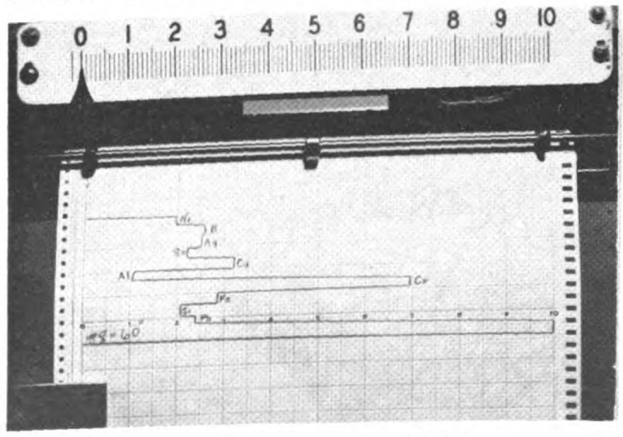
Oil Sample Is "Burned" . . .



And Measured in Quantometer . . .



Results Show Elements . . .



Recorder produces graphic record of concentrations.

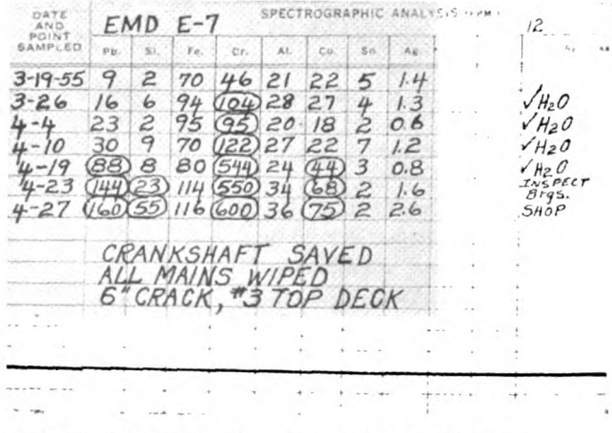
To appreciate advantages of the direct-reading spectrographic analysis of used railroad oils, fuller understanding of the two types of spectrochemical analysis is of value. In the photographic emulsion method, light from the ignited oil sample is diffracted by a concave grating and the different wave lengths of light representing the various elements are directed to a photographic plate where exposure occurs. The photographic plate is subsequently developed and the intensity of the exposures, evaluated in terms of density, is related to the concentrations of the various elements.

By the multiplier phototube method, light from the grating is picked up by phototubes which change the light into current and amplify it up to a million times. This means that measurement of extremely small concentrations of an element is possible in a given lube oil sample. In the production control quantometer (Applied Research Laboratories, Glendale, Cal.) the current from the multiplier phototubes is fed to respective condensers. The charge is further amplified and is then fed to an L&N recorder where the apparent concentrations of different elements in the sample are consecutively recorded in sequence. The apparent values on the recording chart must then be corrected to actual concentrations by means of a calculated chart.

Analysis of a given sample can be completed in a fraction of time—about 2 min—using the direct-reader

Abstract of paper presented at ASTM meeting, September 17, 1956, at Los Angeles, Cal. The author is now chief metallurgist and engineer of tests of the C&NW.

Recorded Continuously . . .



Weekly samples are tested and recorded to produce history.

metnod as contrasted to the photographic method. In fact, only two steps are required with the direct reader as compared to five steps with the photographic method.

Another labor and time-saving device is the Rotrode method of exciting the oil directly. This method may also lend itself to adoption with the photographic emulsion method although our experience is limited in this respect. A small sample (about 2 to 3 ml.) of oil is placed in an aluminum boat which is then positioned in the excitation stand. A rotating high purity carbon electrode disc 0.20-in. thick and 0.50-in. dia, which turns to pick up the oil at a rotation rate of 5 rpm, is partly submerged in the oil. This carries the oil into the arcing zone where a counter electrode is gapped at 3 mm. The method totally eliminates the time-consuming pre-ashing technique and yet gives excellent sensitivity.

It is almost a universal practice to employ an internal standard for spectrochemical analysis. A technique has now been developed with the direct-reading method of eliminating the time-consuming operation of adding an internal standard into each sample of lube oil. With the production control quantometer the reflected beam can be employed as an internal standard. Instead of putting a given amount of an internal standard such as cadmium or lithium into the sample, a portion of the light from the arc reflected by the grating can be viewed by a phototube that charges a condenser to a preset value. When this condenser reaches that value, the arcing is terminated and the charge on each of the condensers produced by the various elements, is measured by the L&N recorder. All elements are recorded in relation to the reflected beam rather than to any added internal standard.

This technique is generally unique in that apparently no one else is employing the above two steps in combination for the evaluation of used engine oil. At the start our aim was to develop a quick, simple, reliable and economical method of analysis. This objective has been achieved with gratifying results. Check runs comparing this technique with that of about 12 other railroad and industrial laboratories employing both photographic and phototube spectrochemical methods, has proved accuracy equal or superior to the other more involved standard methods. Further, two men can analyze, correct, record and report a minimum of 124 runs per 8-hr day, including necessary profiling, calibration and standardization.

The actual evaluation of results from an engine is of paramount importance and is quite involved. Reliable decisions require evaluations and study of (*1*) normal engine wear trend, (*2*) engine history, (*3*) correlations of metals and contaminants, and (*4*) follow-up lube oil samples. Engines of different manufacturers give characteristic reactions when trouble develops. However, individual engines of the same make can react differently when having the same defect.

It cannot be emphasized too strongly that engine history is essential to properly diagnose any engine distress. By engine history is meant mechanical work performed, engine age, past physical and spectrochemical results, and defects formerly experienced. With respect to setting allowable limits for wear metals or contaminants, we are of the opinion that this is not practical. However, limits have been set on the values to serve only as an aid to any diagnosis.

For instance, if chromium from the cooling water treatment should build up to 60 ppm (parts per million) or more, engine attention is required to find and correct the source of a water leak. If a subsequent lead and copper reaction follows, bearing distress may exist and at least a spot bearing inspection is advised. Should no bearing reaction be in evidence, only the water leak need be repaired.

On the other hand, high lead and copper is usually a normal occurrence on new or overhauled engines during break-in period. In this event, bearing inspection would be useless or damaging and could even lead to failure. It must also be realized that much lead and copper is found throughout certain engine assemblies, all of which may simultaneously contribute to high readings. Generally, however, after an engine is fully broken in, a definite level or trend is established from which any deviations can be a justified cause of concern.

In the first example involving a water leak, note the chromium increasing and after about 15 days of operation the lead and copper values increase indicating a bearing reaction. The engine was inspected three

(*Continued on page 62*)

And Interpreted This Way . . .

When LIMITS AS FOLLOWS ARE EXCEEDED, reliable decision requires evaluations and studies as follows: (1) engine trend, (2) engine history, (3) correlations of metals and contaminants, and (4) follow-up lube oil resamples.

a)

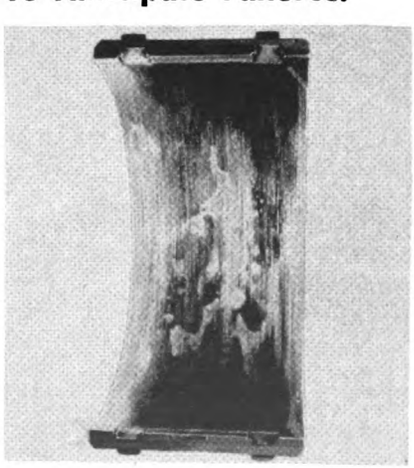
	Parts Per Million				
		ALCO			
	EMD	112	XX	BLW	FM
Lead	40	20	5	10	15
Silicon	10	10	10	10	10
Iron	200	40	40	40	70
Chromium (water)	60	60	60	60	60
Chromium (wear)	30	30	30	30	30
Aluminum	40*	15*	15*	15*	15*
Copper	40	10	5	10	15
Tin	15	10	5	5	5
Silver	5**	-	-	-	-

(*With no excess silicon - air-born-dirt).
(**Maximum of 10 may be allowed with WR-1717 and Gascon G-HD Oils).

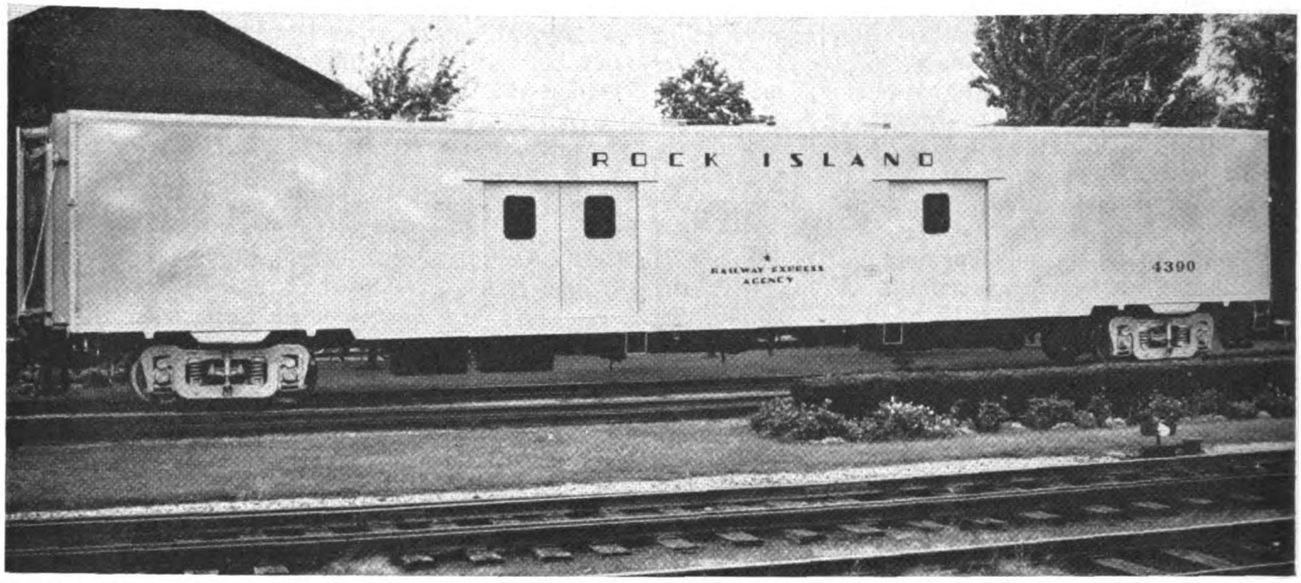
FOLLOW-UP LUBE OIL SAMPLES ARE REQUIRED WITHIN SEVEN DAYS to confirm corrective action in 2 and 3, and to substantiate developing trends in 4.

C&NW has established concentrations which are considered dangerous.

To Anticipate Failures.



Bearing was wiped before being located.



Low-cost baggage cars will permit the Rock Island to write them off rapidly and be prepared to purchase new equipment or rebuild these cars as passenger situation changes. Over pulling faces the cars are 70-ft ½-in., over strikers 67-ft 6-in.

Rock Island Seeks Passenger Service Solutions and ACF Supplies . . .

New Approach to "Head End" Problem

The June meeting of the AAR Mechanical Division heard a statement by a Rock Island representative reporting that the line was getting some head-end equipment costing less than comparable conventional cars previously purchased by the CRI&P. In August and September the latest models of these cars were delivered by the Berwick, Pa., plant of American Car & Foundry. What the Rock Island has received are two types of 70-ft baggage express cars with freight-car contour roofs. From the rail up they are designed for high-speed, long-distance operation.

On the rail are a pair of General Steel's four-wheel BX type trucks. These trucks have 5-1/2 x 10-in. Timken roller bearings, Stucki side bearings, Creco brake beams, and Westinghouse Cobra brake shoes. Wheel base of these trucks is 5-ft 10-in., and they have 33-in. multi-wear rolled steel wheels.

Structurally these cars are of the welded girder type conforming to the strength requirements of both the AAR and RPO specifications. The welded underframe assembly is built up around two continuously-welded, 36.2-lb Z sections of low-alloy, high-tensile steel. These AAR sections give a total center sill area of 21.3 sq in., and extend the full length of the car. The box type body bolsters are built up of 5/16-in. webs, and 7/16-in. cover plates. Built-up welded bolster center fillers and rear lugs are used.

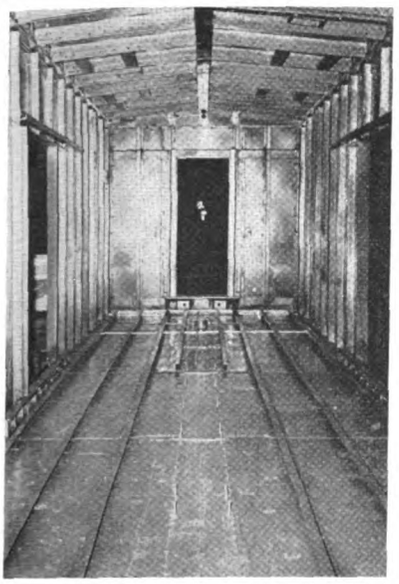
National Malleable multi-pad, rubber-cushioned draft gears are used with Type F couplers. Each end of the underframe is fitted with a cast steel combined striker casting and coupler carrier including carrier springs and retainer plates. Mounted on this underframe are two 7 x 6-in. brake cylinders—one for each truck. The cars utilize Westinghouse 26 brake equipment—the same air brake equipment previously used on the Talgo-type "Jet Rocket." Brake equipment includes two Westinghouse A-16-D slack adjusters, one emergency brake valve, and one signal valve. The Peacock handbrake can be operated from the interior and exterior of the car, and acts on one truck.

Through the length of the underframe are 13 Z-section crossties running across the car. There are six built-up crossbearers between the two body bolsters. End sills are 3/16-in., pressed U sections welded to the center sill and riveted to the side sills.

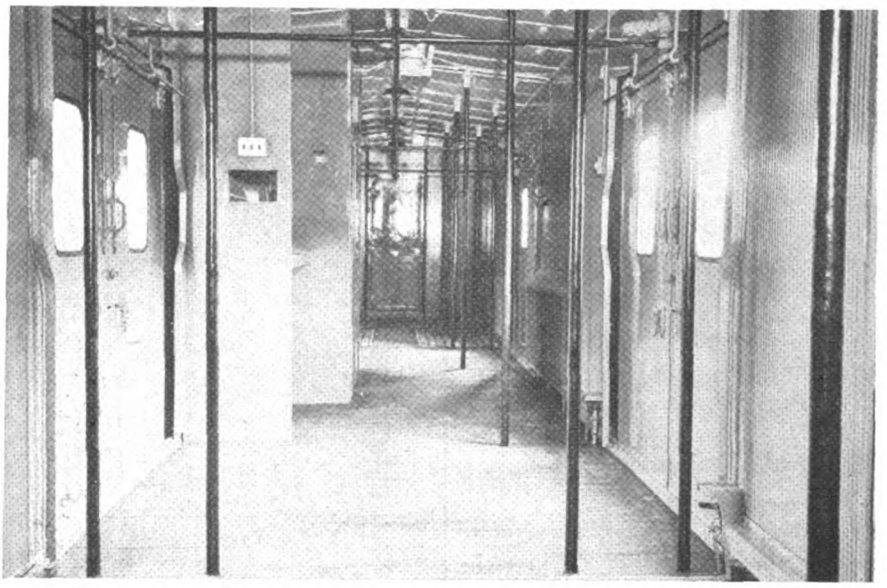
These side sills are 6 x 6 x 5/16-in. angles extending the full length of the car. They are reinforced through the center with 6-in. 12-lb channels extending past the outer edges of the side doorways. The twenty side posts on each side of the car are the same 3-in., 5.1-lb Z sections used for crossties. Door posts are 4 x 3 x 1/4-in. steel angles reinforced at the side sills with 5/16-in. gussets. Door headers are this same angle, and above them are cripple posts of the same Z section used for the side posts. All these posts are welded at the top to continuous lengths of Standard Railway Equipment's ZU side plate.

Welded to the all-welded side frames are 0.105-in. low alloy, high-tensile steel side sheets. End sheets and roof sheets of the car are of copper bearing steel. On each side of the end door opening are 8-in., 28-lb CB beams extending from the end sill to the end carline. At each end, running between the two 1/4-in. W-section corner posts, and between the two side plates, is a 10-in., 20-lb channel which is welded to the intermediate framing, and serves as an anti-telescoping protection.

The end sheathing of the car is in three pieces. Each of the two side sheets is 0.120-in. thick, and the portion over the doorway is 0.180-in. The 24 carlines are shaped to the contour of the standard AAR freight car roof, and are made of 5 x 3-1/2



Interiors of cars are finished with plywood panels applied to steel framing.



The interior length is 65-ft 7½-in. and interior width, 9-ft 2⅝-in. Fifteen of the cars have the messenger facilities.

x 5/16-in. carbon steel angles. Roof sheets are 0.075-in. copper bearing steel welded to carlines and side plates. Passenger car ventilators are used in this roof.

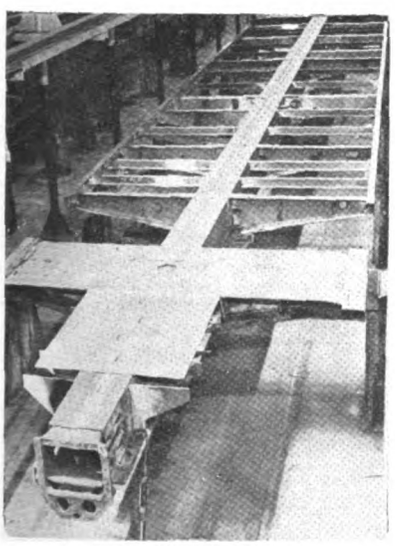
The false floor is 0.060-in. galvannealed steel sheets riveted to the crossties and floor stringers, and welded at the edges to the center sill, side sills, and crossbearers. The longitudinal floor stringers are 3-in. Z-sections and there are six of them across the width of the car. Yellow pine furring strips attached to the stringers support the 1-3/4 x 5/16-in tongue-and-groove flooring. This flooring is applied transverse of the car and secured to framing with watertight bolts and speed nuts.

Fifteen of the twenty-five cars in this order have messenger facilities. These messenger cars are also equipped with fish racks. This meant a variation in the floor construction to hold the galvanized drip pans and drains under these racks. All of the cars have a 6-ft, single door opening, and an 8-ft, double door opening on each side. All side doors are sliding, 1-1/4-in. Plymetal type. All side doors in the messenger cars, and the 6-ft doors in the other cars are glazed with 1/4-in. Duolite safety glass. End doors are built-up steel construction.

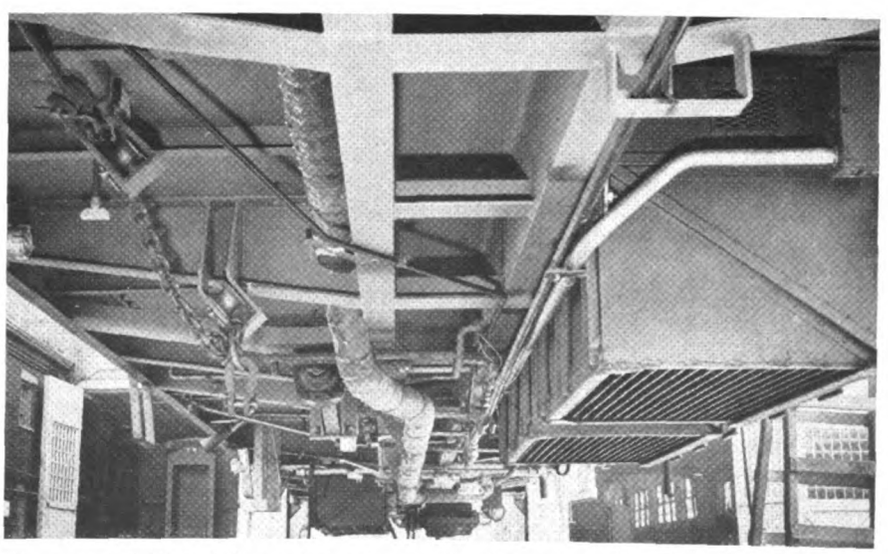
Car ends are fitted with Morton single-fold diaphragms. The 0.180-in. pressed diaphragm face plates are supported by rods in rubber mountings, and are positioned with ACF lower buffer mechanisms and Standard Railway Equipment's upper buffer springs.

The car sides, ends, roof and floor are insulated with 1-in. thicknesses of Jhons-Manville stone felt. The side and end linings are 1/2-in. exterior-grade, Douglas fir plywood secured to framing with self-tapping screws. The headlining is 3/16-in. preswood secured to furring with Screwtite nails. The electric locker, clothes locker and toilet enclosures on the messenger cars are steel sheets.

Heating on all the cars is with Vapor manually controlled aluminum-finned copper tubing. This tubing is protected in expanded metal enclo-



Welded underframe is built with a truck center distance of 52-ft.



There are individual, body-mounted brake cylinders for each truck, and they are actuated by Westinghouse 26 equipment. Only messenger cars have the battery boxes.

sures. Lower side door tracks have steam lines under them to prevent freezing. The steam train line is 2-7/8-in. OD steel tubing with Barco 2-1/2-in. metallic connectors at each end. The messenger cars have a gravity type water system fed from an insulated 40-gal. overhead tank. Water is piped to an Ajax Consolidated water cooler, and to the toilet facilities. Hot water is supplied through a Vapor heater and mixing valve. In the toilet are a Mink stainless washstand, and Duner hopper.

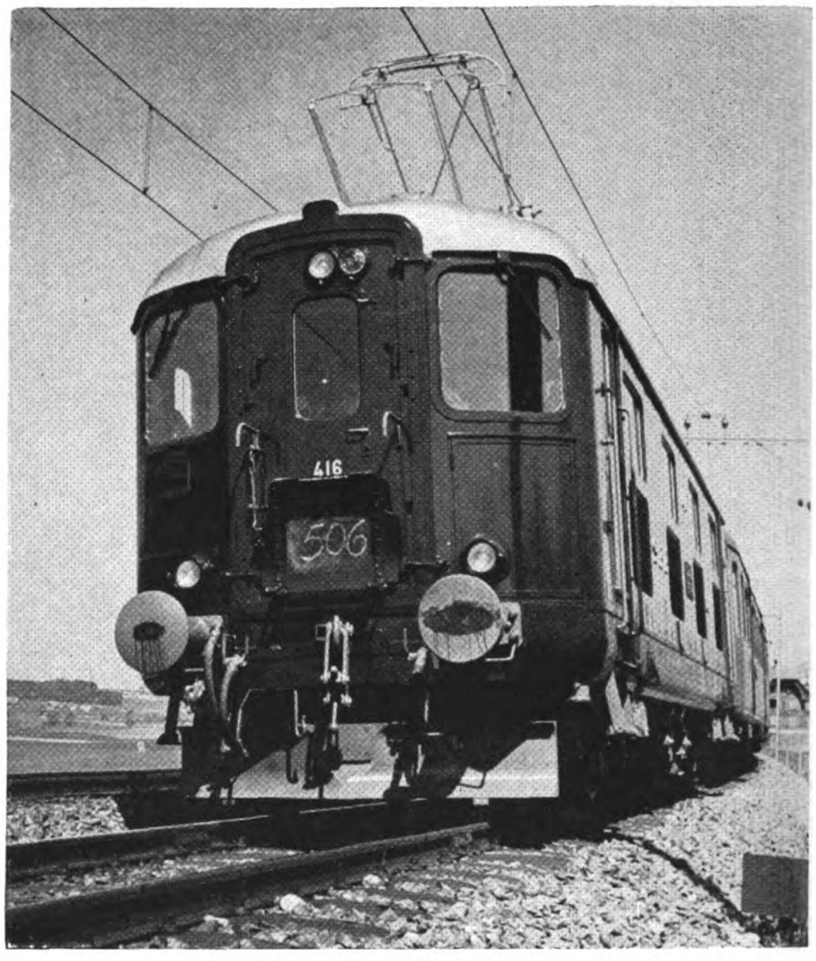
Electrical Equipment

The messenger cars have a desk and a 60-hole letter case. These cars also have axle generating equipment. This 64-volt dc system includes a Safety 4-kw body-hung axle generator driven through a Dayton double V-belt drive, Safety generator regulator and reverse current relay, Safety switchboard, and two 5-tray A-8 HW Edison batteries. Lighting is provided with seven Safety ceiling fixtures and four side-door lights. Both messenger and non-messenger cars have 1/0 trainlines with Pyle National two-wire trainline receptacles and P-N two-wire trainline connectors.

The non-messenger cars have four ceiling lights equipped for 32-volt operation, and a permanent 30-ft extension cord. The DPDT lighting switch has both 32 and 64-volt positions, and 110-volt standby power can be utilized through a General Electric dry-type auto-transformer which drops the voltage to 60 volts.

Underframe and interiors of sides, ends and roof are painted with standard freight car primer. In addition the underframe is painted with freight car black paint. The lower part of the side and end structure and sheathing, and the sub-floor assembly are painted with Rustoleum. The exteriors of the sides, ends, doors and roof receive one coat of red oxide primer and two coats of Dulux aluminum gray paint. The plywood lining is painted with one coat of primer and sealer followed by two coats of RPO green enamel. The ceiling is finished in high glass white enamel. The black external stencilling is sprayed.

The messenger cars have a capacity of 25 tons and a cubic capacity of 4,975 su ft. They weigh 90,000 lb. The other cars have a cubic capacity of 5,287 cu ft, a load limit of 35 tons, and weigh 78,500 lb.



Electric Locomotive of Swiss Federal Railways

Wheel Slip Can Be Controlled Without Sand

When a pair of driving wheels slip on one of the recently equipped Swiss Federal Railways locomotives, the operator pushes a button which initiates a light application of straight air brakes on all drivers. Release of the button causes an almost instantaneous release of the brakes. Such brake applications are of very short duration. The time is long enough to bring the slipping wheels down to locomotive speed without causing appreciable braking of the locomotive. With brakes having 2.75 in. brake piston travel, the time required for an application is .32 sec, and for release it is .4 sec. When the piston travel is 5.5 in., the application time is .8 sec and the release time .65 sec.

Brake control of wheel slip also serves to keep wheel treads in a condition which is not conducive to slip. Brake control of wheel slip was first tried in 1951 on the Swiss railways. At present, 80 locomotives are so equipped, special attention having been given to new electric and diesel-electric locomotives put in service since 1953.

The same equipment has been ordered for 280 existing locomotives and will soon be delivered. Subsequently, about 60 per cent of all electric motive power for main line service will be equipped. Locomotives in yard service are equipped with only one sand pipe for each direction of locomotive movement. All the other sand pipes are removed

No difficulty has been encountered in using the brake on locomotives and railcars operated in multiple unit. Twelve type 1-D-1 locomotives operated in multiple unit were first to be so equipped and the use of the device on electric multiple-unit equipment operated in suburban service has just been started.

The wheel slip indication device used is based on the difference of current values in the traction motors on a locomotive or car. This difference is measured with an ammeter having a special dial which is placed on each engineman's desk.

To check the effectiveness of the device, sandboxes were sealed on several locomotives. In addition, the sand valves on 26 locomotives were locked. It was found in this manner that the anti-slip device is even more effective than sanding. It is the intention of management to build a series of new electric locomotives without any type of sanding device.

The device known as the anti-slip brake, was designed by S. A. Brown, Boveri & Cie, Baden, Switzerland, and was developed and simplified by the Ateliers des Charmilles, S. A., Geneva, Switzerland.

The Anti-Slip Brake—How It Works

The brake control valve shown in the diagram is made of phosphated cast iron. Moving parts are made of oxidized aluminum alloy. The valves and valve guides are brass and the springs stainless steel. The chambers are separated by flat membranes made of soft synthetic rubber. Operation of the engineman's pushbutton applies 24, 36, or 72 volts to the electro-pneumatic valve depending upon the voltage of the locomotive auxiliary power.

Applying the Brake

When the brake is not in operation, air from the main tank through *lead 1* keeps pressure in *chamber 2*. *Valve 3* is kept open by the pressure of *spring 4* until air from *chamber 2*, passing through *valve 3* builds up enough on *membrane 7* to close *valve 3*. By adjusting the tension of *spring 4*, the pressure in *chamber 6* can be varied from 1.1 to 7 lb per sq in.

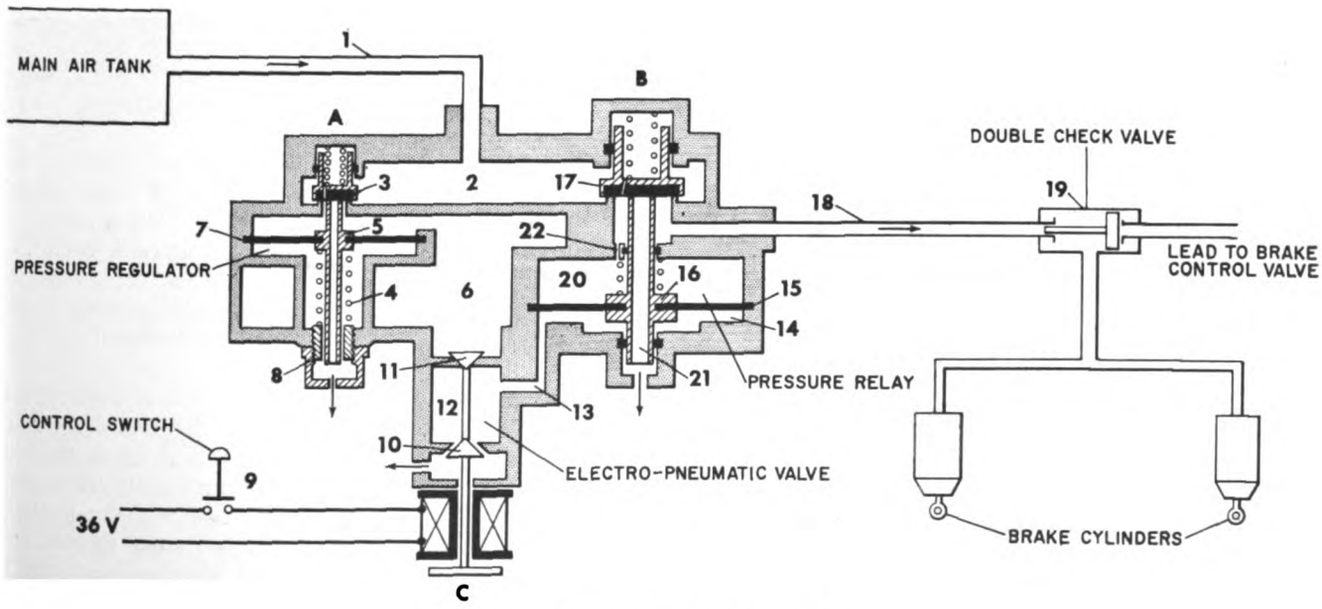
When the electro - pneumatic valve is energized by the engineman, the *outlet valve 10* is closed and the *intake valve 11* is opened. Air then enters *chamber 12* and passes through *lead 13* to *chamber 14*. This applies pressure to the lower face of *diaphragm 15*. This raises *assembly 16*, opens *valve 17* and shuts off the *outlet lead 21*. Air from the main air tank pressure in *chamber 2* then enters *chamber 20* and flows through *lead 18* and through the double check *valve 19* into the brake cylinders.

When the pressure in the brake cylinders has equalized with the pressure in *chambers 6* and *14*, namely 1.1 to 7 lb per sq in., the *assembly 16* moves down and closes *valve 17*, shutting off the passage between *chambers 2* and *20*.

Releasing the Brake

The moment the pushbutton is released, *intake valve 11* closes and *outlet valve 10* opens. This allows air to escape from *chambers 12* and *14*. Pressure in *chamber 20* then causes the *assembly 16* to move down, uncovering *lead 21*, allowing air in the brake cylinders to escape quickly to atmosphere.

The double check *valve 19* provides for operating the brakes by push-button when in the position shown. It automatically moves to the left, shutting off *lead 18* when the brakes are operated from the brake control valve.



Schematic of wheel-slip control system.

HOW TO

Learn About Air Brakes

... AND HAVE FUN DOING IT

AB Brake Equipment 2-B

This is the second installment on the AB Equipment in the Air Brake in Color Schematics series. For the 2A installment and the color chart see page 87 of the November 1956 issue.

Equipment Arrangement

In this schematic we have purposely shown right angles in the piping for convenience. This would not be the case on actual equipment. Color the sketches in sequence, starting with Sketch 7.

Emergency portion during preliminary quick service (Sketch 7). When a service reduction causes pressure on the emergency piston to be less than that on the quick-action chamber side, the piston moves to the right. This continues until the emergency spring guide strikes hte left end of the slide valve. The piston carries the graduating valve to connect ports and passages. This allows quick-action chamber air to escape at the rate that brake pipe air is reduced on the opposing side of the piston. The operation is easily followed in the diagrams. Observe the encircled numbers and the attached explanations.

With a yellow pencil color the space at the right of the emergency piston, the passage into and including the block marked "strainer", the short passage to the service portion, and passage *b* "To Brake Pipe". Dampen with a brush and let dry.

Now, with heliotrope, color the entire space at the left of the emergency piston, including the space above the slide and graduating valves. Carry this to the underside of the spillover check valve, including the block marked "Quick-action Chamber". Proceed in passage *v-2* to "AT" (atmosphere).

When dampened and dried fill in with an orange pencil as follows: Starting above the spillover check valve, color *e-5*, into *e-3*, the upper end leading into a blank at the slide valve, and the bottom end leading into passage *e-2*, coloring both *e-2* and *e*. Dampen and let dry.

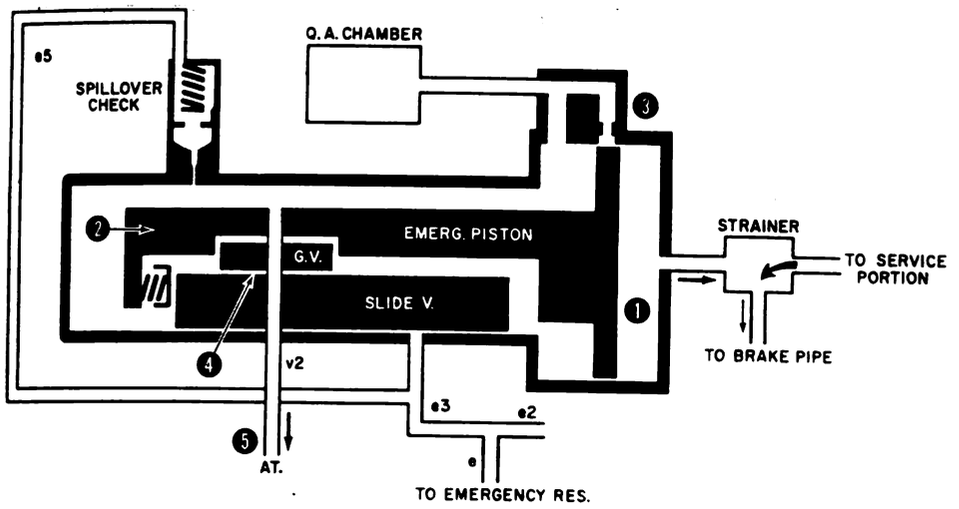
Service, second stage (Sketch 8). In the second stage of service, cylinder volume is built up from the auxiliary reservoir and brake pipe pressures. With dark green color the space to the right of the service piston. Continue above the slide and graduating valves, the charging passages and passage *a* to the auxiliary reservoir. Carry the dark green into passage *c3* through the slide valve. Stop at the slide valve seat. Again dampen and allow to dry.

Switch to yellow. Shade the narrow space at the left of service, the passage into and including the strainer, out of the strainer into the space to the right of the emergency piston. Continue in the passage from bottom of the strainer, passage *b*, the *b5* cavity in the service slide valve, passage *c8* into the quick service limiting valve, and the space around the check valves. Stop at the chamber entrance between the upper check valve and the diaphragm. Dampen and let dry.

Where the dark green ended, start with a pink pencil at the slide valve seat, fill passages *c3*, *c4*, and the space between diaphragm and check valve. Color the horizontal passage *c3* into *c6*, the cavity in the emergency slide valve and the passage leading down to the inshot volume. Include this volume, and the passage to the inshot piston chamber, coloring to the closed piston seat. Continue in passage *c2*, directly into the spring chamber of the inshot valve. Go past its seat and its passage to the brake cylinder. Dampen and dry. Again with heliotrope, color the quick action chamber as in "Preliminary quick service."

Service, third stage (Sketch 9). Pressure building up in the cylinder also increases under the quick service limiting valve diaphragm. When a 9 lb pressure is reached, the diaphragm is reflected upward, overcoming its spring. This permits the upper check valve to close, cutting off further flow of brake pipe air to the cylinder. Quick service activity stops until another service application is made.

Once more with dark green, color a very short part of passage *c3* through the service slide valve but stop where the slide valve contacts its seat. After dampening and drying, start at that point with a pink pencil, coloring passage *c3* into *c4* and the space under limiting valve diaphragm. Go on with pink from *c3* into *c6*, the cavity in the emergency slide valve, and passage *c7* into and through the inshot volume. Color into and include the spring chamber of inshot piston. Proceed



Sketch 7

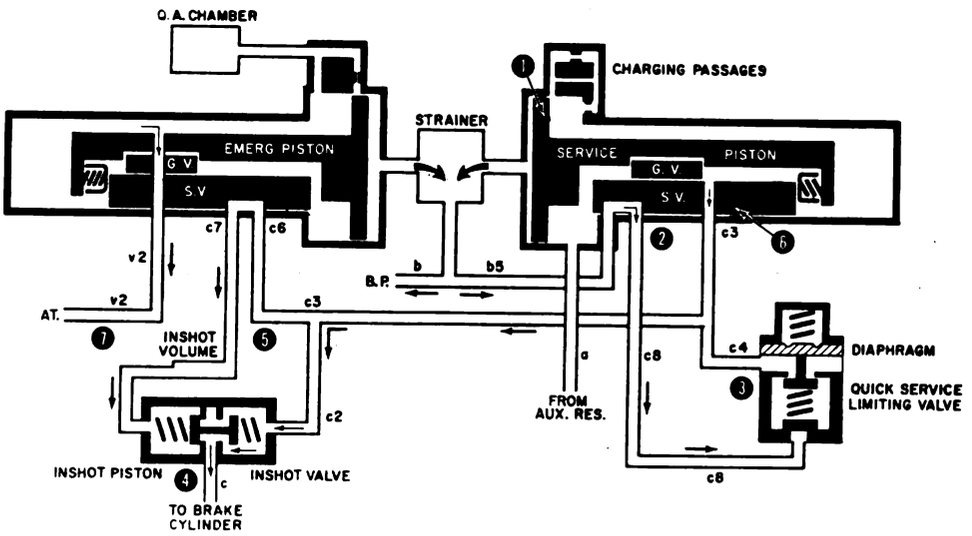
Emergency Portion During Preliminary Quick Service

1. Brake Pipe reducing at right of Piston.
2. Piston moves out until stopped at Slide Valve.
3. Charging Port, Brake Pipe to Quick Action Chamber closed by Piston.
4. Graduating Valve connects Quick Action Chamber to passage v2.
5. Passage v2 to atmosphere.

Sketch 8

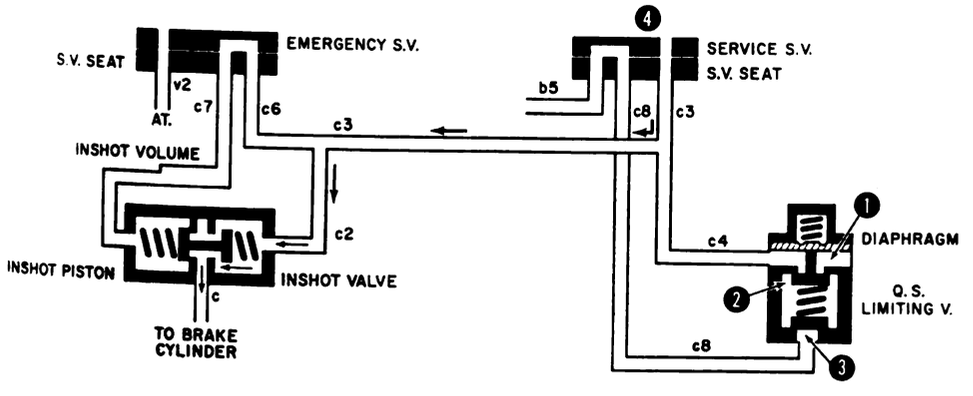
Service, Second Stage

1. Brake Pipe reduction continues. The Service Piston moves to the extreme left, taking the Slide and the Graduating Valve.
2. The Slide Valve connects Brake Pipe passage b5 to c2 to Quick Service Limiting Valve.
3. Brake Pipe air past the Limiting Valve Check Valves to the Brake Cylinder passage c4, c3, c2 to inshot portion.
4. Past open Inshot Valve to passage c to the Brake Cylinder.
5. Brake Cylinder passage c3 to c6, through the cavity in the Slide Valve to c7 to Inshot Volume, to the left end of the Inshot Piston (holding the Piston Seat closed and the Inshot Valve open).
6. Auxiliary Reservoir air past the Service Graduating Valve to the Brake Cylinder passage.
7. Emergency portion as in "Preliminary Quick Service," (Quick Action Chamber to "AT" via passage v2.



Sketch 9 Service, Third Stage:

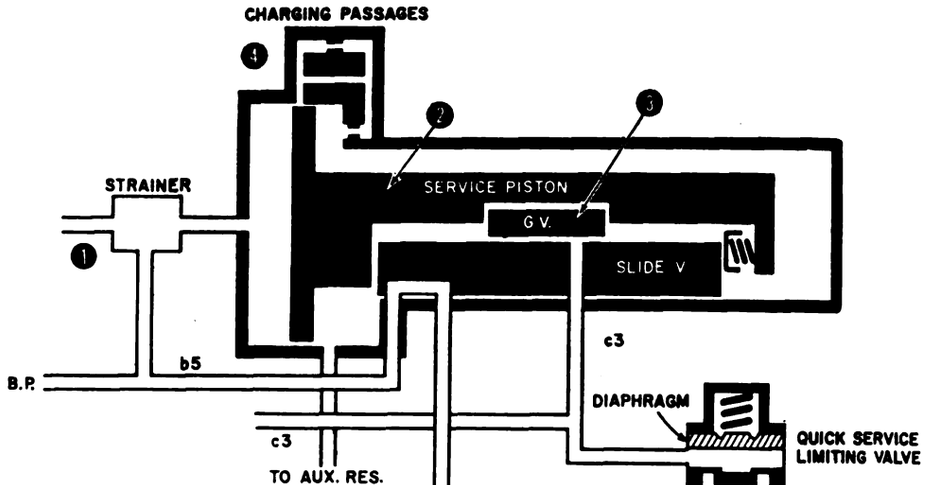
1. Brake Cylinder pressure having built up to approximately 9 lbs, overcomes the tension of the spring.
2. Diaphragm is deflected upward, the Check Valve closes.
3. Brake Pipe flow past Limiting Valve to Brake Cylinder stopped.
4. Auxiliary Reservoir air to the Brake Cylinder via c3, c2, past Inshot Valve, passage c to the Brake Cylinder.

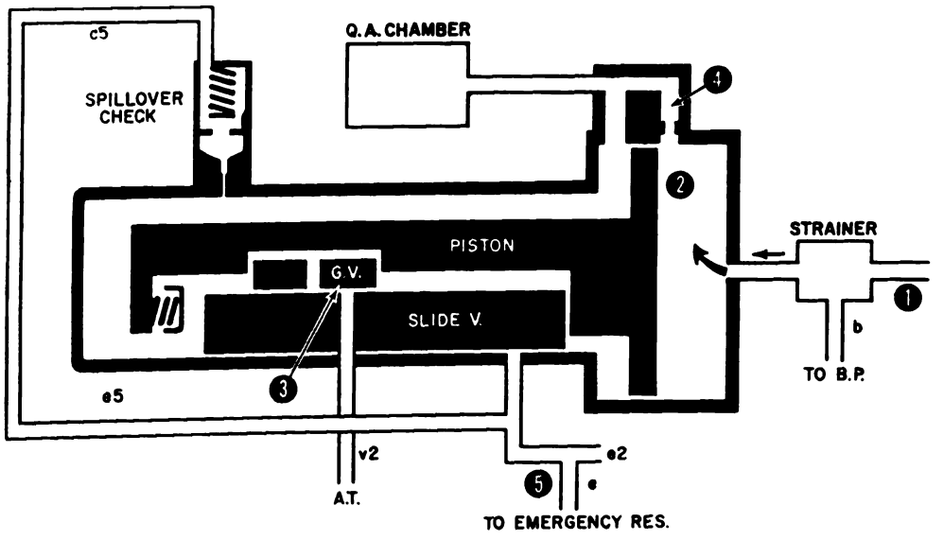


Sketch 10

Service Lap, Service Portion

1. **Brake Pipe reduction has stopped.**
2. **After the Auxiliary Reservoir pressure has reduced sufficiently, owing to flow into the Brake Cylinder, higher Brake Pipe pressure moves the piston to the right, to the Slide Valve.**
3. **The Graduating Valve closes the passage from the Auxiliary Reservoir to the Brake Cylinder.**
4. **The Charging Port from the Brake Pipe to the Auxiliary Reservoir is closed.**
5. **The Check Valves in the Quick Service Limiting Valve are closed.**





Sketch 11
Service Lap, Emergency Portion

1. **Brake Pipe Reduction has stopped.**
2. **After the Quick Action Chamber air has reduced below that of the Brake Pipe, the Emergency Piston is moved to the left, to the Slide Valve.**
3. **The Graduating Valve has closed the passage from the Quick Action Chamber to "AT" (v2).**
4. **Charging, the Brake Pipe to the Quick Action Chamber is now open.**
5. **The Emergency Reservoir volume is still fully charged.**

from horizontal passage *c3* and fill in passage *c2* into the inshot valve chamber. Go past the open inshot valve to passage *c* to the brake cylinder. Dampen and let dry. With heliotrope color passage *v2* through the emergency slide valve and seat. This remains open as long as brake pipe pressure is being reduced in front of the emergency piston.

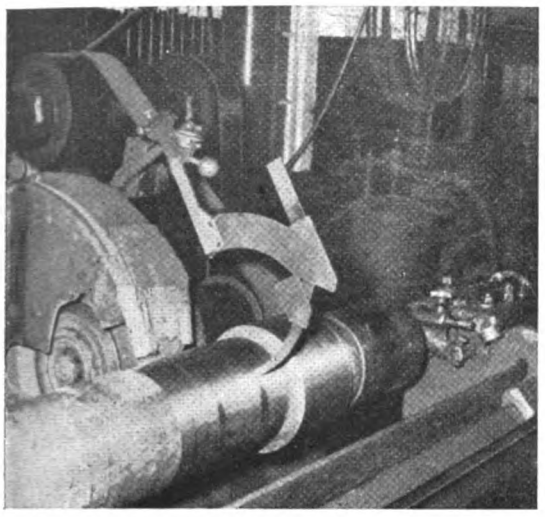
With a yellow pencil, starting at passage *b5*, color the slide valve cavity, passage *c8*, and the chamber between the two check valves.

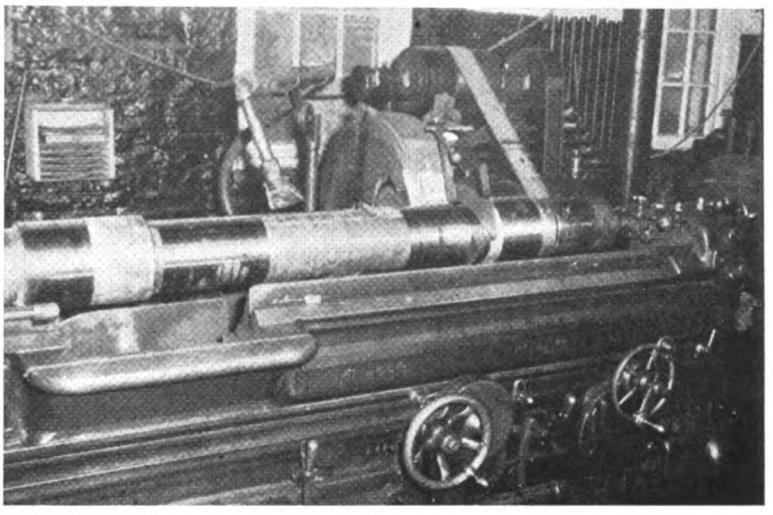
Service, lap-service portion (Sketch 10). With dark green, color the space to the right of the service piston. Include the charging passages and the passage to the auxiliary reservoir. Dampen and let dry. A yellow pencil is used to color the space at the left of the service piston, into and through the strainer, passage *b5*, passage *c8*, and the space between the two check valves. Dampen and allow to dry.

Once again, with a pink pencil, fill the space under the quick service limiting valve diaphragm, passage *c4*, passage *c3*, one branch blanked at the graduating valve, and another branch (unfinished) leading to the left. Dampen and let dry.

Service lap, emergency portion (Sketch 11). With heliotrope, shade the entire space to the left of the emergency piston. Include the quick action chamber, the passage leading to it, and proceed to the under side of the spillover check valve. Here, in heliotrope dashes, fill passage *v2* (blanked at graduating valve), as there is no pressure present at this time. The heliotrope in the charging passage should not go beyond the point where the passage meets the piston bushing. Start at this point with yellow and color the space to the right of the emergency piston, into the strainer and connecting passages. Dampen and let dry. Change to an orange pencil. Starting at the spring chamber of the spillover check valve, color passage *e5* (blanked at slide valve), passages *e3, e2, and e*. Dampen and dry.

Ideas for the Car Repair Man...



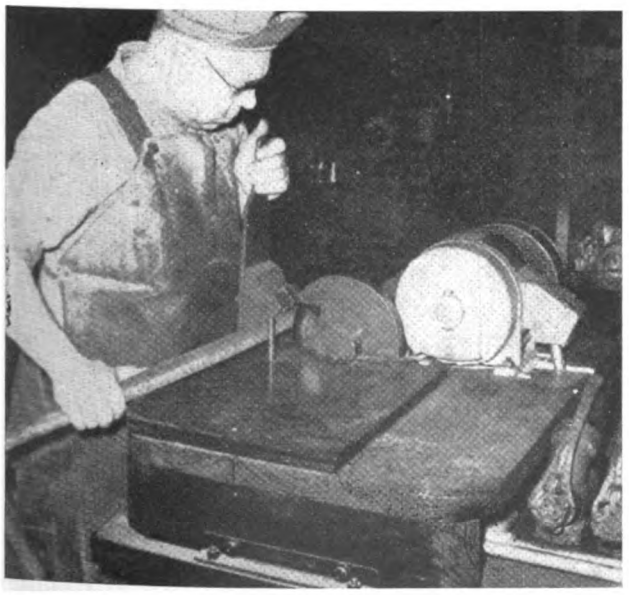


Cutting arrangement both for armored and rubber hose developed at the GM&O shops in Bloomington, Ill. The wheel, 8 in. in diameter and made of tool steel, takes but a few seconds to cut armored hose which takes the teeth off hack saws. The wheel is driven at 3450 rpm by a 1,750-rpm motor of 2-hp rating to maintain speed while cutting.

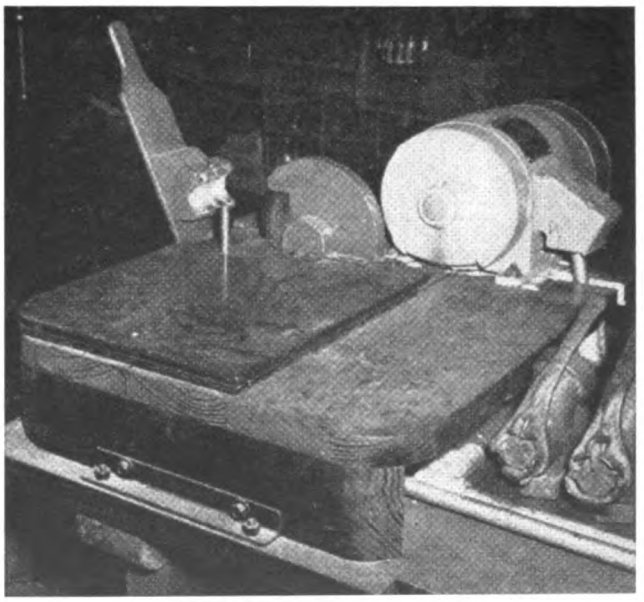
CONTINUOUS CHECKING OF GRINDING WORK.—The GM&O has equipped a grinder in the Bloomington, Ill., wheel shop with an Arnold hydraulic grinding gage (made by Federal Products, Providence, R.I.) which gives a continual indication while grinding an axle of how many thousandths of metal remain to be removed to bring the section to specification size.

The grinder to which the indicator is attached does the finishing of both car and diesel roller bearing axles. The indicator—which rides on the axle from the completion of the roughing pass until the grinding is finished—tells by its dial gage how much oversize the bearing section is at any stage of the operation as well as whether any taper burrs, or out-of-roundness exists.

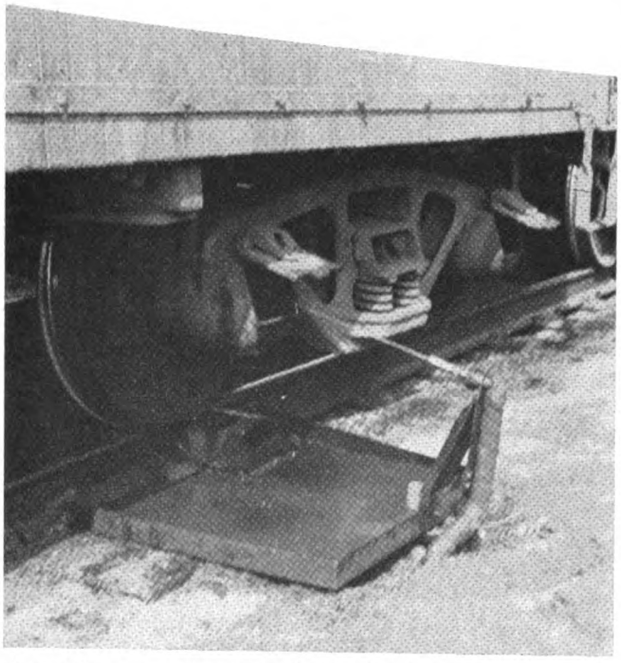
The indication is by three-point contact as shows in the sketch. The first step in its use is to mike the axle after machining. If, for example, it is .012 in. over the finished size called for the dial indicator is set at .012. When the indicator reads zero, the axle will be ground to required size.



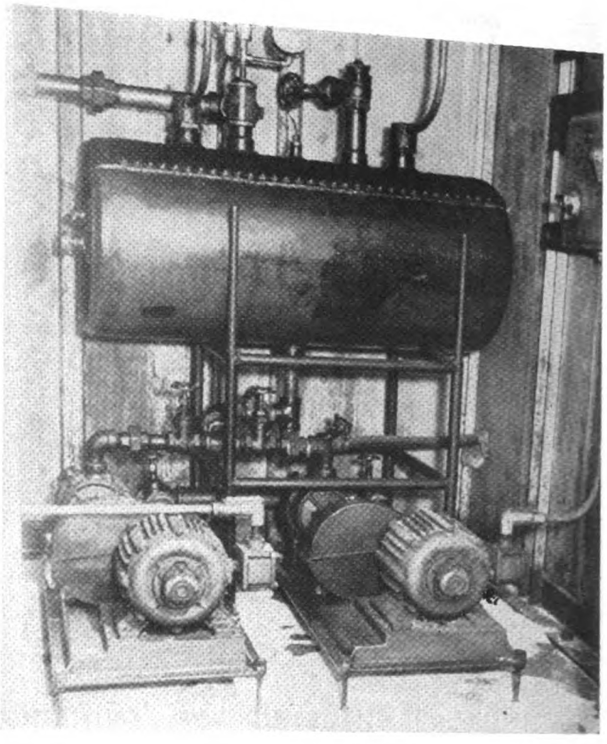
How the gage looks . . .



How it slips over the axle to give continuous measurement.



As each box passes the oiler, a jet of oil delivers about half a pint of oil to the box.



At right: Oil from the 10,000-gal. supply tank is pumped into a 40-gal. pressure tank in which pressure is maintained at 75 lb by pressure-controlled, motor-driven pumps.

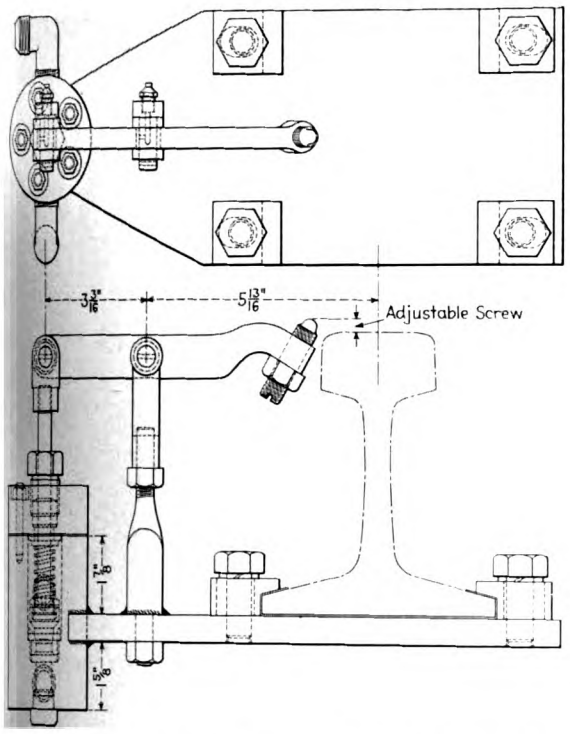
Left: At each oiler position, there is a 10-gal. standpipe in which the oil temperature is maintained at a constant temperature of 90 deg. Heater wire on the pipes insures the same temperature up to the control valve.

Automatic Journal Box Oiler

THE ROCK ISLAND has developed an automatic journal box oiler and has placed it in service in its Silvis, Ill. classification yard. The oiler is located 200 feet ahead of the hump, and as the cars pass, about a ½ pint of oil is added to each journal, on both sides of the car. In anticipation of the oiling, box covers are lifted when the air is drained in the receiving yard and the boxes are open when the cars pass the oiler.

Oil is delivered to the oiler at a pressure of 75 lb., and as each car wheel on one side of the car passes, it operates a valve which releases about a pint of oil, half of it going to the two boxes on opposite ends of that axle.

At humping speed, nearly all of the oil released by the

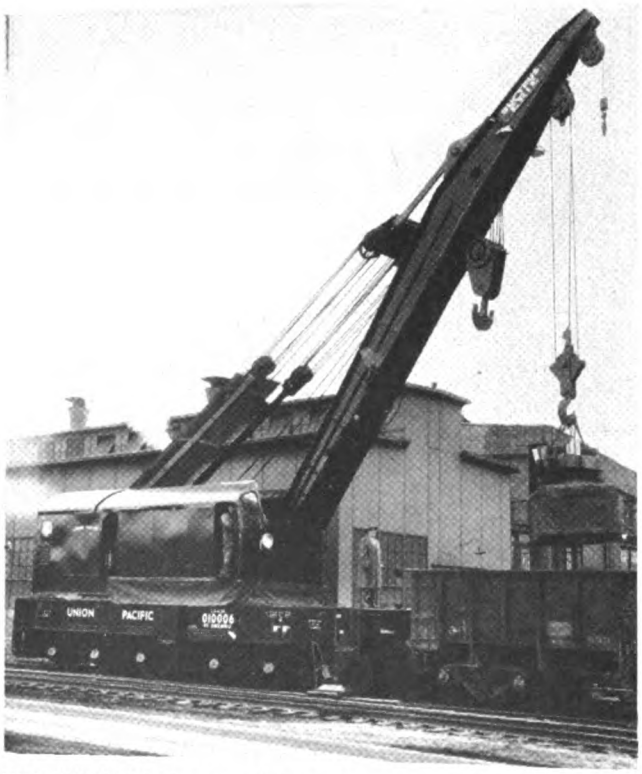


Details of the tripping mechanism. The amount of oil delivered may be controlled by adjusting the screw on the end of the tripping arm.

valve goes into the boxes. A small amount falls into drip pans from which it is drained, filtered and returned to the supply tank.

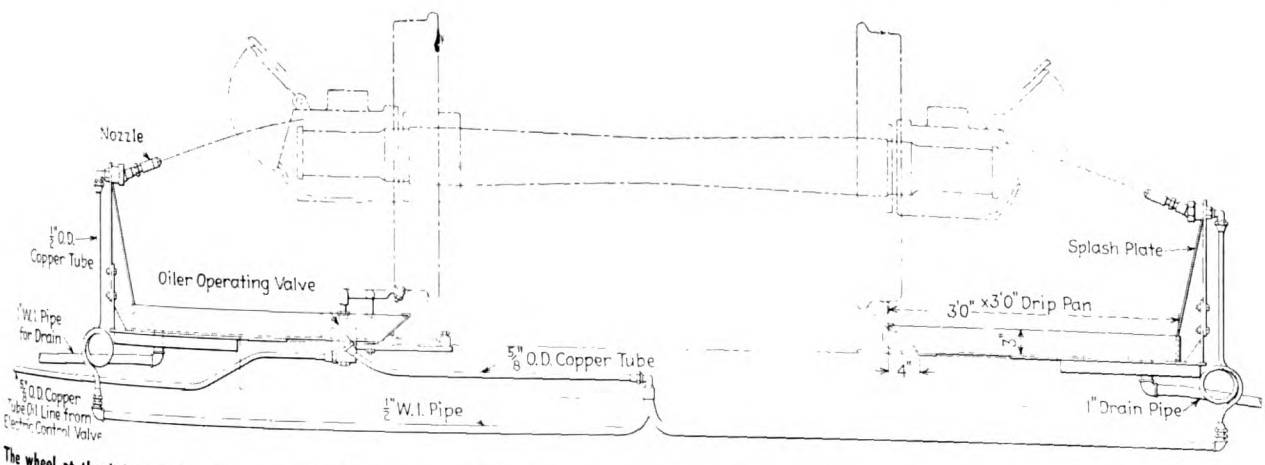
Two motor-driven pumps take oil from a 10,000-gal. main supply tank and pump it into a 40-gal pressure reservoir, automatically maintaining a pressure of 75 lb. The second pump will cut in at slightly higher pressure if the first fails to operate.

Operation of the system disclosed an important requirement of design. The upper portion of the pressure tank contains air which acts as a cushion and the pressure on this air controls the motor starters. In time the air will leak out of the tank and the tank will go solid. To take care of this situation, a small, intake air valve with a light spring is placed in the suction line. This lets in a little more air than is needed, and when the amount of air exceeds the desired quantity, a float valve releases the air in the tank to the atmosphere.



THE "MONSTER".—The Union Pacific adds a crane to its three steam-powered cranes of the same capacity already in use on the railroad. Powered by two 175-hp diesel engines driving two generators, it can move under its own power at a speed of three mph, supply air from its compressor for the brake system of a small string of cars, act as a switch engine in an emergency and set up for heavy lifting operations in about 10 minutes as compared to the 45 minutes to an hour needed to ready a steam-powered crane of similar capacity. Use of diesel power does away with the separate fuel and water car required by steam-powered cranes.

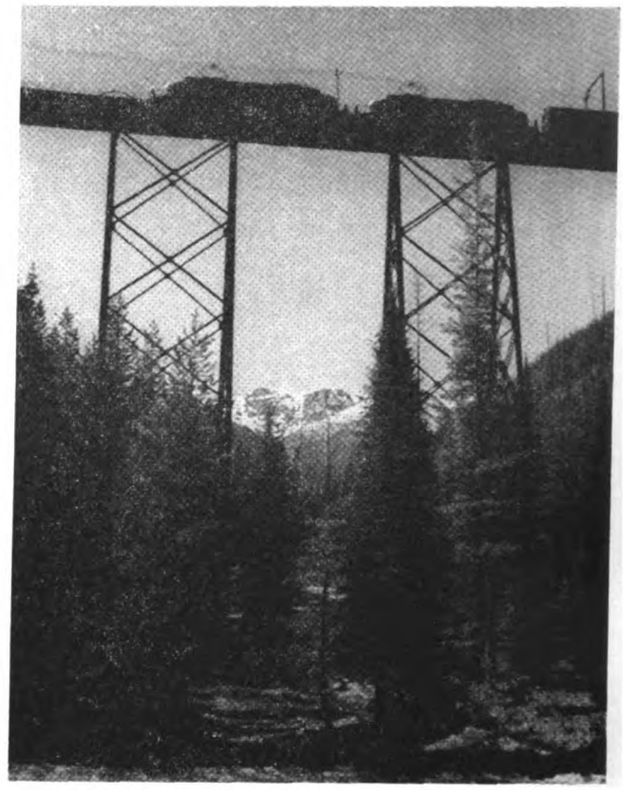
An immersion heater in the pressure tank holds the oil temperature at 90 deg. From the pressure tank oil is delivered to a standpipe holding 10 gal of oil placed at each lubricator position. Immersion heaters in the standpipes maintain a 90-deg oil temperature. Pipes from the standpipes to the lubricators are wrapped with heater wire and insulation and these serve to keep the oil at 90 deg right up to the release valves. A uniform delivery of oil is thus maintained at all seasons of the year.



The wheel at the left actuates the valve which releases oil to the boxes on both ends of the axle.

Electrification Will Come Back

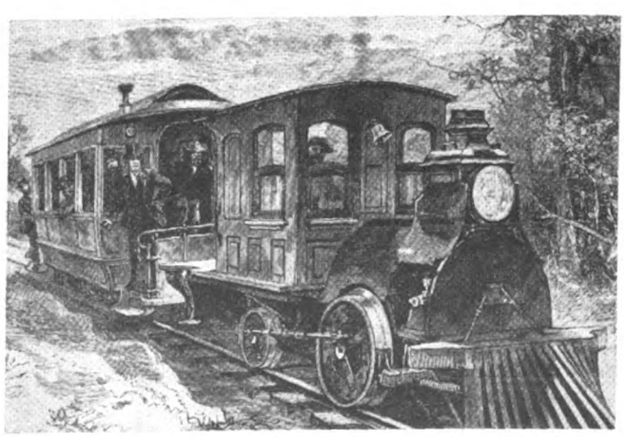
- *Where did we come from?*
- *Where are we?*
- *Where are we going?*



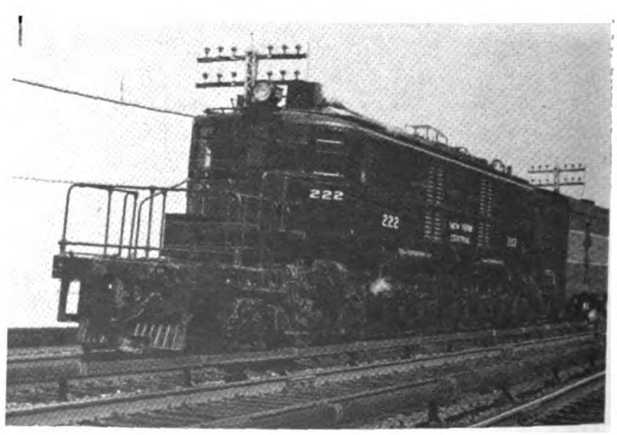
Two CMSt P&P type EF-4 locomotives on the head end of a 5,800-ton train climbing eastward on the 1.7 per cent grade in the Bitter Root Mountains. A 4-unit, 8,000-hp helper locomotive is also used in the middle of these trains. The locomotives shown on the viaduct were built for Russia and converted for service on the Milwaukee.

RAILROAD ELECTRIFICATION is the term commonly used to describe the employment of motive power which consists of locomotives or multiple-unit cars which receive electric power from an overhead wire or a third-rail contact system. Such electrification for steam railroad service was inaugurated in the United States in 1895 on both the Baltimore & Ohio and the New Haven. From this beginning, it developed until 1937, the year in which the Pennsylvania extended its electrified lines from Paoli, Pa., to Harrisburg, Pa., the work involving 315 miles of line and 773 miles of track.

Total mileages electrified in the United States never exceeded three per cent of the total and in recent years several electricification installations have been abandoned. The reasons in most of these cases are that the electrification was installed for operation through tunnels and perhaps also over heavy grades. As diesels replaced steam locomotives, it became possible to operate through the tunnels without creating dangerous conditions and also to negotiate the grades to better advan-

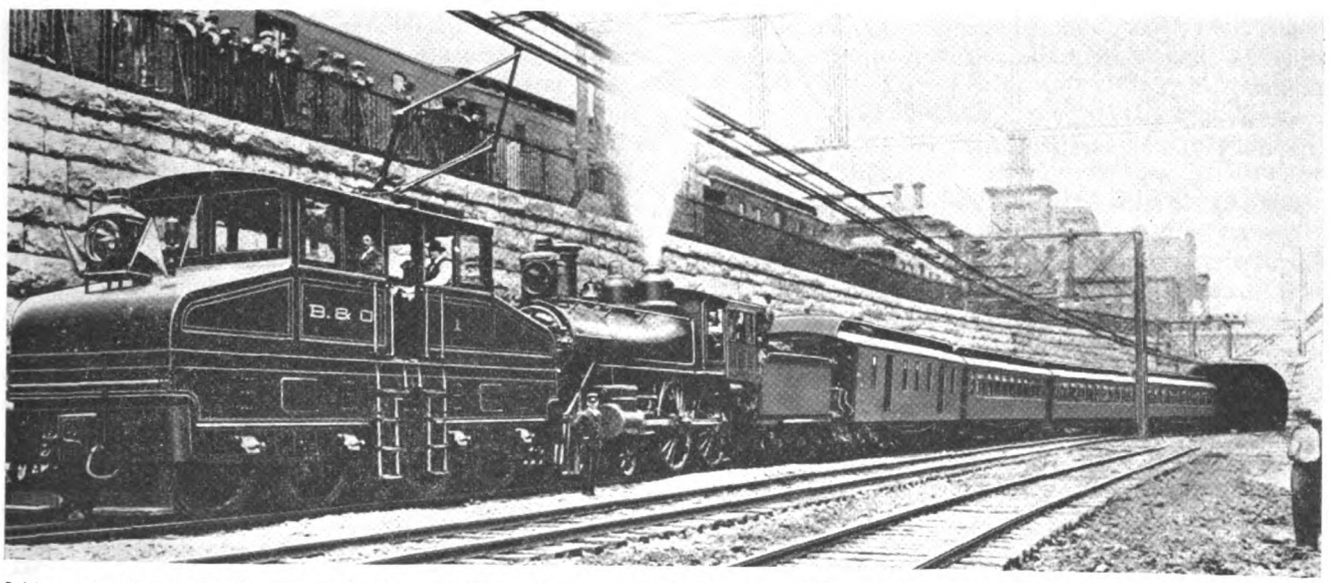


Thomas A. Edison locomotive—predecessor of American electric locomotives operating on a circular track at Menlo Park, N. J. Picture was taken from a wood cut appearing in the July 15, 1882 issue of Harper's Weekly.

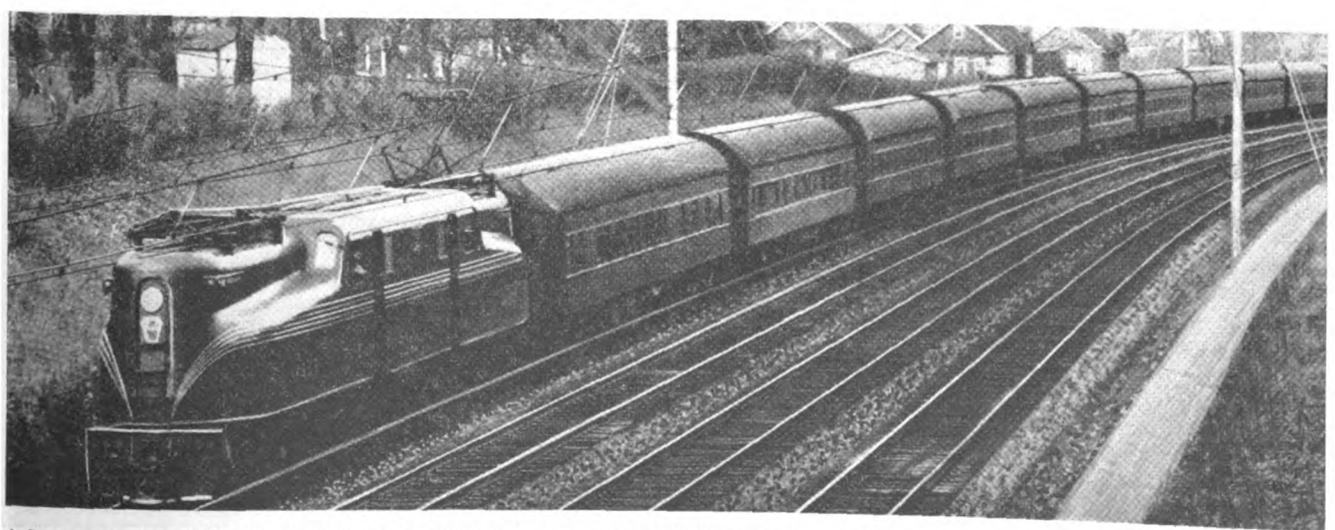


New York Central train operating along the Hudson river between Harmon, N. Y. and Grand Central Station in New York City. The locomotive is a converted 3,000-volt unit formerly used on the Cleveland, Ohio terminal.

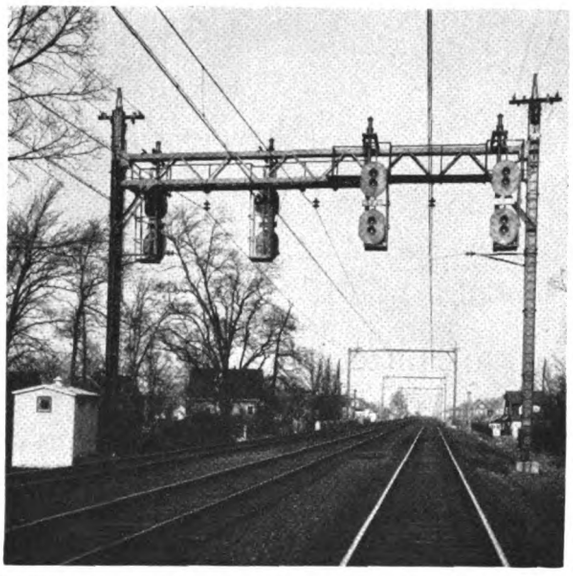
An Illinois Central m-u train with two steam locomotives. The one at the left was the first type (Mississippi) used to haul commuter trains (1880 to 1926) and the one in the center was displaced by electrification.



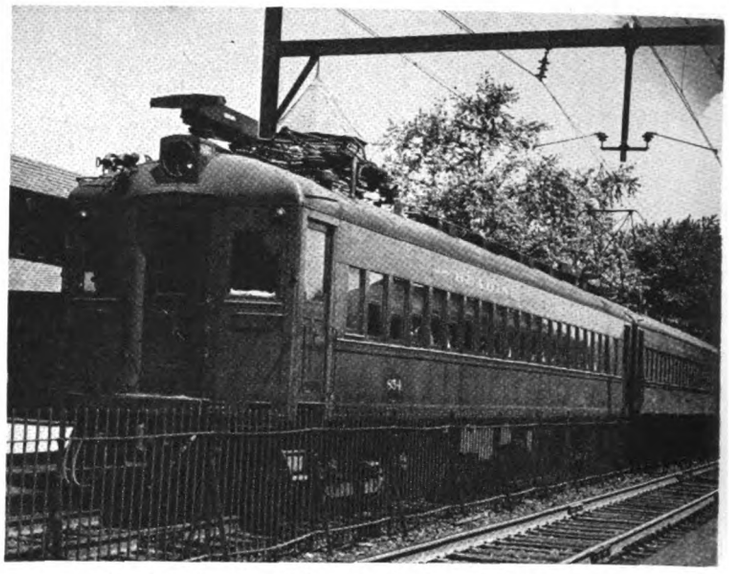
Baltimore & Ohio electric locomotive hauling a passenger train through the Baltimore, Md. tunnel in 1895. This electrification, now abandoned, was the first mainline steam railroad electrification in the United States.



A Pennsylvania type GG1 electric locomotive. These units are used for both passenger and freight service. . . . . . *continued on next page*



Lackawanna suburban service was electrified in 1931 using a 3,000-volt d-c overhead contact system.



Reading suburban service was electrified in 1931 using a 12,000-volt a-c contact system.

tage. The change to diesels was made more attractive by the fact that it was no longer necessary to change locomotives at each end of the relatively short electrified sections.

Why So Little Electrification?

Railroad electrification had an auspicious early life. It was felt by many that it was only a matter of time until all steam locomotives would be replaced with electrics. But electrification has two inherent handicaps. A large financial investment must be made to provide the power supply and contact systems and to this are usually added costs of revision of the signal and communication systems. The second inherent limitation is that an electric locomotive cannot run out from under the overhead wire, and unless a line is completely electrified, it will be necessary somewhere to change motive power.

The large investment involved for wayside facilities must be amortized over a considerable period of years. It is, of course, difficult to look far into the future to determine what a railroad's needs may be, and top management which must make the decision is usually composed of men who have only a few years to serve with the railroad and who, being human, are more interested in making a showing during their regime rather than in providing for a future generation.

In the light of present-day knowledge, it appears that some of the early electrifications were built too expensively. Also, the respective proponents of a-c and d-c systems allowed themselves to become involved in "the battle of the systems." It has since been shown that either system will provide adequate performance at similar costs, but the argument raised doubts in the minds of prospective users.

Present Status

Electric locomotives now make up almost exactly two per cent of all the locomotives owned or leased by Class I railroads in the United States. Steam locomotives account for 14 per cent, as of October 1, 1956, and nearly all of the remainder are diesels. On this basis, there are those who maintain that our railroads are already more than 80 per cent electrified. To them our dominant form of motive power is not a diesel locomotive with electric transmission but rather an electric locomotive which incorporates a diesel engine which shortens the life and increases maintenance costs of electrical equipment and definitely limits the short-time overload rating of the locomotive.

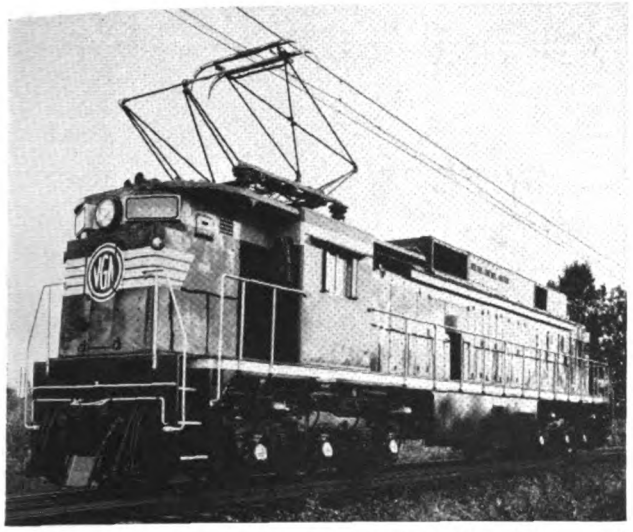
It is pretty thoroughly established that the electric m-u car provides the most effective means of handling the mass transportation requirements of commutation service, subways and rapid transit lines. The electric system can deliver the high short-time overload rating that is necessary to permit of the high acceleration rates required for fast schedules with many stops. The Budd RDC cars are a contender for a part of this business and it is hoped that lightweight, diesel locomotive-hauled trains may improve passenger train schedules.

Performance on the Pennsylvania's electrified lines could probably not be equalled by any other form of motive power. Any encroachment by diesels except for switching service seems improbable. An extension would appear more likely.

The durability of an electrified system has been established on the Milwaukee with its 440- and 220-mile electrified sections. By means of a few changes, some simplification and the addition of some new motive power, this installation, now 40 years old, is matching or exceeding anything the diesels can do. The New Haven which was electrified in 1907 also has a contact system which is still good for another 40 years.

Where Do We Go From Here?

The diesel-electric locomotive is dominant in the motive power field. Any encroachment on its territory by electrification will probably be caused by the rising cost of fuel oil without a corresponding rise in the cost



A Virginian motor-generator type electric locomotive with its coal train. These locomotives could be operated on commercial frequency.

One of 10 rectifier-type locomotives in service on the New Haven. The road also operates 100 rectifier-type m-u cars.

of electric power. Expenditures for locating and developing petroleum in the U. S. doubled from $24 million in 1950 to about $51 million in 1955, while demand for oil both here and abroad continues to increase. Electrical energy, derived in the U. S. largely from coal and in part from water power, seems relatively less susceptible to a price increase.

Effective means of reducing first costs of electrification are available. It is now practicable to take 25,000-volt power from the contact system at commercial frequencies, change it to d-c power by means of conversion equipment on the locomotives and deliver it to d-c traction motors. This is being done in France, and the Belgian Congo, and will be used for the greater part of electrification to be installed in England and Japan. D-c motors for this application are now better and less expensive than formerly, because they are mass-produced for diesel-electric use. Rectifier locomotives and a motor car operating from 12,000-volt, 25-cycle a-c power system were worked out on the Pennsylvania, and the New Haven now has 100 such motor cars and 10 such locomotives in service. Twelve rectifier locomotives are being built for the Virginian. The electric locomotive is notable for low maintenance costs and diesel maintenance costs have climbed to a point (about twice that for electrics) which, coupled with obsolescence, indicates that they have an economic life which is closer to 15 than 20 years.

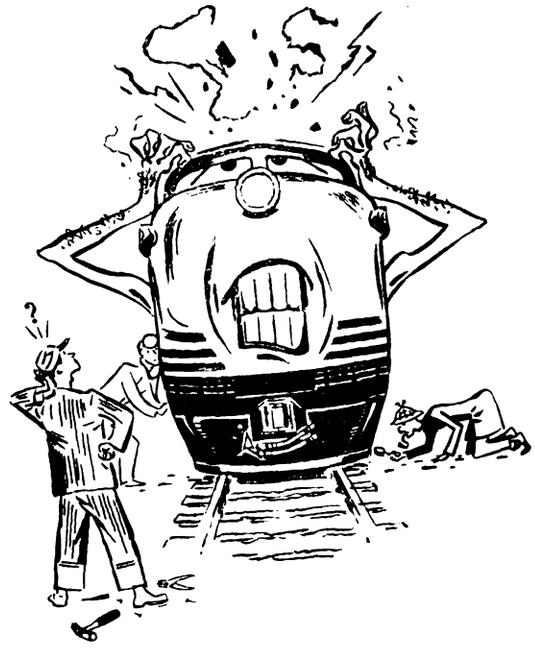
The gas turbine-electric locomotive is relatively a new comer which may help to bear out the often-repeated prophecy that the reciprocating engine will disappear. There are 25, 4,500-hp gas turbine locomotives in service on the Union Pacific and this railroad has placed an order for 15, 8,500-hp locomotives which may be increased to 45. This type of power source is capable of delivering enormous power in a relatively short self-powered locomotive, and it may be able to show low maintenance costs. In those areas where bunker C fuel is available at half the cost of diesel oil, its overall fuel cost is about the same as the diesel oil, since the thermal efficiency of the diesel is about twice that of the gas turbine locomotive. Perhaps the coal-burning gas-turbine may be able to show lower fuel costs. In its present form, the gas-turbine locomotive would seem unsuited to switching and transfer service and some road service, the reason being that it consumes about half as much fuel at idling as it does at full load. But, the 8,500-hp locomotive will have a better fuel rate and much higher ones are possible.

The atomic-electric locomotive too has potentialities, but designs can scarcely be said to have reached the drawing board. It is already possible to build such a locomotive, but present costs would apparently make it uneconomic and the size of the necessary protective shield just barely gets inside railroad clearances. At the moment, like an atomic airplane, it would apparently be primarily of military value because of being able to operate for long periods without refueling. Stationary atomic power plants seem to have a better chance of competing economically with other power sources and may furnish energy from contact systems to electric locomotives.

From 1935 to 1955, the price of fuel oil to the railroads rose from 4 to 9.4 cents per gallon. Dollar wise, this is little if any increase, but it is a considerable rise as compared with the cost of electric power. During 1955, the unit price of oil paid by the railroad declined slightly. This was due at least in part to the fact that the railroads are finding means of using lower-grade fuels, sometimes at the cost of increased maintenance. It appears now that these developments may temporarily stay the rise in the price of locomotive fuel. Unfortunately, as the demand for lower grades of oil increases, the price of these grades increases.

Diesel motive power will undoubtedly continue to serve the railroads capably for a long time. These will be continuing demands for more horsepower per unit and some of these may be met by the gas turbine. But with continuing demands for more power, increasing prices of locomotive fuel, and an appreciation of the relatively low maintenance and high performance characteristics of the electric locomotive, American railroads will again decide to electrify some of their lines. It would be foolish to try to say when, but an ultimate reversal of the current trend in the United States seems inevitable.

The Diesel With Shattered Nerves



By Gordon Taylor

A REAL PUZZLER for about two weeks, this case aroused an unusual lot of comment and speculation as to the cause of trouble.

The locomotive involved was a four-unit EMD F-3 freight locomotive. The case opened when a report was received that the three trailing units had failed in service and had to be towed to a repair point. The crew had changed out the jumper cable, but could not restore the units to service.

At the repair shop, the locomotive was carefully tested; but nothing was found wrong and, since it met all service tests, it was dispatched for service and made a successful trip.

However, on the following trip, it again failed, and the crew turned in a weird story as to all of the strange things that happened when the trailing units failed. In failing, the alarm bells rang, the engines shut down and the reverser changed from a *run* position to a *neutral* or *off* position.

Again, the locomotive was tested at the repair shop, but the trouble had disappeared and nothing would cause it to show up in the test at the service inspection track. The locomotive was again dispatched for service, ran several hours and then failed, with more confused reports as to its actions while failing.

The symptoms were very erratic as reported, and no two reports of the crew seemed to agree. The trouble was of the *come-and-go* type and it was always *gone* when the locomotive was at the repair shop. Thus, the case developed into somewhat of a mystery.

The cause of trouble was so elusive that it seemed that this group of units was haunted by some evil spirit that could hide away and hide the trouble until the locomotive was again out on the line far from its home terminal.

During this period of confused trouble reports, I could not help comparing it with a case of trouble that had occurred many years ago, on a Pullman sleeping car. In this earlier case, a Pullman porter reported, in a very worried manner, that something was wrong with the car to which he was assigned.

Asked what was wrong, he said "Last night the annunciator bell rang for berth No. 13, and when I answered the call, the berth was empty,—in fact it had not been occupied." He further stated that the same thing had happened a few nights before under similar circumstances. Asked why that worried him so, he said, "I am not superstitious, but that is the same berth that a passenger died in not too long ago, and it makes me wonder if that poor fellow is still ringing for help, or if it is a case of mixed up wiring. Something is mixed up, and something must be done!"

The porter's mind was placed at ease when it was discovered that the insulation on the wires leading to call button No. 13 had become chafed, and under certain conditions of vibration on the moving car, the wires would contact and register a call on the annunciator. A simple repair of the defective wire ended the mysterious trouble, and the porter said, with a sigh of relief, "That is mighty comfortin'."

A comparison of the trouble on the Pullman car and the mystery trouble on the diesel, clearly indicated that the latter must be associated with something that occurred only when the locomotive was in motion.

All reports seemed to indicate that a thorough check up on the nerve system, or the control system of the locomotive was in order. And in the words of the porter "something must be done."

It was decided to hold the locomotive out of service, until a fine comb inspection of the control system wiring could be made, starting with the jumper cable between the lead and the first trailing unit.

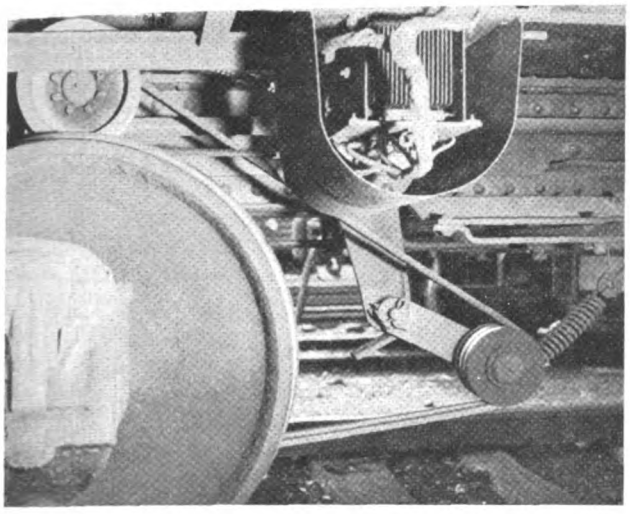
The jumper cable, as had several others previously used on this unit, tested okay.

We next completely removed the jumper cable receptacle from the front end of the first trailing unit, to examine the wire connections at rear of the receptacle. The connections were found to be okay.

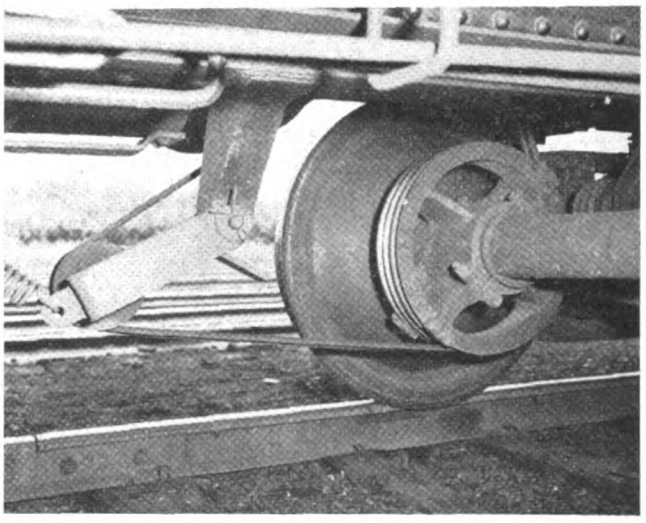
The receptacle was replaced and a test of the locomotive indicated everything was okay and the trailing units were responding properly.

(*Continued on page 60*)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



Two V-belts running over an axle pulley and an idler pulley drive the smaller of two pulleys on a jack shaft. Two V-belts from the larger pulley on the jack shaft drive a Leece-Neville generator.



Inside view of drive showing V pulley on the axle and long belt to minimize misalignment.

Caboose Power for Cold Climates

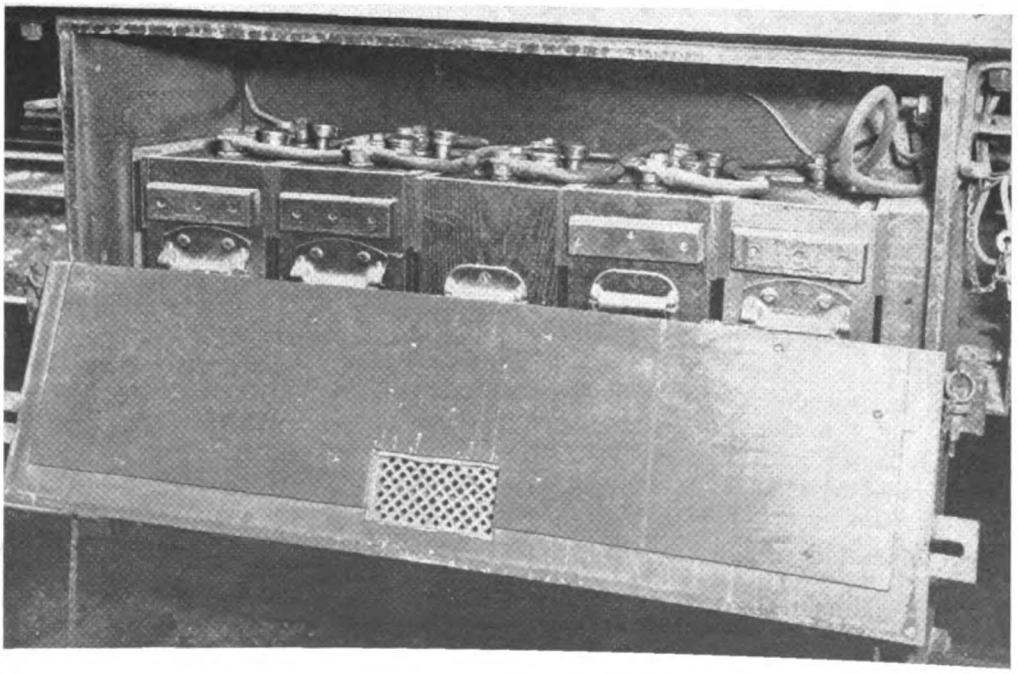
THOSE WHO EXPERIENCE cold weather for short periods can take a leaf out of the Ontario Northland's book if they need caboose radio power supply. On the northern end of this road, winter temperatures between 40 and 50 degrees below zero are common, and devices which do very nicely in warm weather have a way of giving trouble even, when it gets really cold. The Ontario Northland recently adopted train radio and has come up with a satisfactory answer to the power question.

Information, Courtesy of Storage Battery Power.

Ontario Northland meets the requirements with V-belt generator drive and tight insulated battery boxes

The power supply system (12 volts nominal) consists of a high-speed Leece-Neville alternator and a rectifier having a d-c output of 90 amp together with a 9-cell A8H Edison nickel-iron-alkaline storage battery.

The radio load amounts to 21 amp while transmitting, and 3.5 amp during receiving and standby. In



Battery boxes are insulated and snowtight.

addition, five outlets have been installed for 25-watt medium-base inside-frosted lamps representing a maximum load of approximately 10 amp. The maximum load connected at any one time is thus approximately 31 amp, compared to the 8-hour discharge rate of the battery, 42.5 amp. The capacity of the battery is estimated to provide an operating reserve of 16 to 18 hours for the average of the connected loads.

When it was originally installed, the alternator drive consisted of three V-belts and a combination of a flat driving pulley on an axle, two V-idlers and a V-driven pulley so arranged that only the flat sides of the belts were on the driving pulley. Tests showed that this arrangement was impractical for operation in cold weather because of belt slippage on the driving pulley as a result of ice and snow conditions.

Similar conditions had previously caused slippage of flat-belt axle generator drives on passenger-train cars. It was found that, at times, these conditions were so severe that belts were frozen rigid, and would remain completely motionless when the axle pulley would turn. This experience resulted in a program of installing positive drives.

To meet the same problem on caboose cars, the flat axle pulleys are being replaced with V-pulleys. The belts are being arranged to pass underneath the driving pulleys instead of above as before, thus permitting their V sides to run in the grooves of the V pulleys. To minimize the effects of changes in the position of the driving pulleys when the cars are on curves, the idler pulleys are located at a considerable distance from the driving pulleys, as shown in the illustrations.

Another associated problem is that of maintaining the storage battery within a satisfactory temperature range. The nickel-iron-alkaline batteries are used to avoid damage from freezing in the case of a generator failure.

The Ontario Northland's experience with positive generator drives on passenger train cars has shown that, even under the most severe weather conditions, the batteries can be maintained at satisfactory operating temperatures by means of suitably insulated, snow-tight battery compartments. So long as the normal amount of current is kept flowing through the battery in either direction during the run, experience has shown that enough heat is generated to maintain a satisfactory operating temperature provided this heat can be retained during the run and the normal layover periods.

To accomplish this purpose, the electrical department, more than 10 years ago, designed a battery box which has since become standard on passenger-train cars. Boxes of similar design are being applied to caboose cars.

These boxes are of welded steel construction. The overall outside dimensions are: length 3 ft 8 in. long, height 2 ft 4½ in. and width 17 inches. They are lined with ⅜-in. plywood exclusive of the floor which is 1-in. pine on which 8 battens of ¾ by 2¾ in. cross section are laid crosswise. Located equidistantly along the centerline of the floor are four $1\frac{3}{16}$ in. ventilating openings. A grating, 3 by 5 in. at the top of the door, which is snowtight, completes the arrangements for controlling the ventilation.

The radio equipment has been installed on 12 caboose cars and is being installed on 6 more.

The Diesel With Shattered Nerves

(*continued from page 58*)

Apparently, the trouble had corrected itself and the real cause was in hiding. Since we had declared war on this particular case of trouble, we refused to settle for anything less than the location and correction of the cause.

We decided to move directly back from the jumper cable receptacle to the first point where the control circuits might have a favorable spot to develop throuble. This led us to the terminal board located over the end door just inside the car body. Here all the wires from the rear of the jumper cable receptacle, attach to bolted connectors, that connect them with the control wiring system inside the car body.

That spot is where we found the villain that had caused so much trouble. It was the bolted connection on the terminal post that connects the *N-4* wire from the jumper receptacle to the *N-4* wire in the car body wiring system. The connection had been loosely made.

The copper terminal was confined to the bolt, but the nut had not been securely tightened and as a result the lug had been badly burned and corroded, so it no longer made a secure and dependable contact.

When the locomotive was standing and the vibration was at a minimum, the connection was good enough to pass the usual test. Even when the locomotive was in service the connection would often be good enough to permit operation for several hours, then suddenly trouble would appear.

It would be well to consider what caused the wide variation in trouble symptoms reported by the engine crews. That is easy to understand. The control system is composed of 27 wires (or nerves), that control all operating functions of the multi-unit locomotive. It is the nerve system that causes coordination of action between the lead unit and its trailing units.

One wire, *N-4*, provides the return circuit for the other 26 wires, or nerves. So *N-4* is the key wire of the system since all others depend upon it.

At any given instant, the trailing units are called on to function in a certain manner. If all those functions are interfered with by a failure of *N-4* wire, you can see that many different things will happen at the same time. What happens depends on the events that were taking place when the circuit through *N-4* wire failed. For example, the fuel pump circuit would fail, and the reverser controls would be interfered with,—in fact almost anything could, and did happen.

This case was rough on the nerves of the engine crews; and it was especially nerve racking to the maintainers as well as rough on the nerves of the locomotive.

When the case was closed out and the locomotive was once more a dependable member of the diesel fleet, all concerned heaved a sigh of relief, and echoed the sentiments of the Pullman porter, when he said, "That is mighty comfortin'."

The lesson to be learned from this case is to remember that the control system of the diesel locomotive is its spinal cord, and just as a pinched or severed nerve in your body will impair some bodily function, so will a similar condition in the nerve system of the diesel impair its proper functioning.

ADAPTABLE TO ALL DROP BOTTOM GONDOLAS

Wine Drop Bottom Locks and Spring Hinges have long been established as the practical method for drop bottom closure. Basic simplicity and ruggedness of the mechanism requires little or no servicing, and the accesible method of adjustment on the individual lock assures positive door fit.

Featuring single door operation, any or all doors open as required to control lading distribution. Maintenance-wise, a single door and mechanism may be dismantled without disturbing adjacent doors. The Wine Drop Bottom Combination offers all the important improvements — individual door fit, minimum maintenance, and easy, one man selective operation.

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

Quantometer Speeds Evaluation

(*Continued from page 43*)

times in an effort to locate the water leak. By this time, all main bearings were found wiped but the crankshaft was saved. This proves that early detection of a water leak in the seeping stage can prevent subsequent potential engine damage or major repair costs.

In another case, water converted to steam by high bearing temperatures caused momentary washing of lubricant but the bearing was recovered with no damage. Air-borne dirt has caused a sudden increase in silicon and upsurge in lead value.

In the second example several valve bridges were found in bad order, as indicated by the increase in copper alone.

The typical silver reaction, shown in the third example, proved difficult to analyze. Every possible means was used to isolate the location without tearing down the engine. By coincidence, the cylinder assembly in which the highest clearance was found served to locate unusual wear of a silver wrist pin bushing (this is not considered a reliable method of finding such a condition).

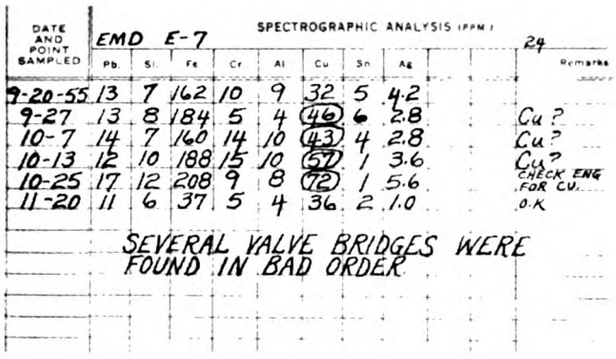
The result of ring-belt blow-by in scoring an aluminum piston is illustrated in the final example.

C&NW Conclusions

The multiplier phototubes of the quantometer provide extremely high precision and sensitivity when compared with the photographic emulsion technique. The special technique developed by the C & NW lends itself to the desired precise, simple, quick, reliable and economical results and eliminates time-consuming operations, such as ashing and the use of an internal standard, for spectrochemical analysis of used diesel crankcase lube oil samples.

The reliable evaluation of analytical results is largely dependent on normal engine wear trend, engine history, correlation of metal and contaminants, and follow-up lube-oil sample results. Also to be considered are the various types of locomotive engines, nature of road service, and maintenance policies.

Difficult to trace was the failure in diesel engine valve bridges. Symptoms had been evident for almost entire month prior to the location of actual metal break-down.



EMD E-7 — SPECTROGRAPHIC ANALYSIS (PPM) — 24

DATE AND POINT SAMPLED	Pb	Si	Fe	Cr	Al	Cu	Sn	Ag	Remarks
9-20-55	13	7	162	10	9	32	5	4.2	
9-27	13	8	184	5	4	(46)	6	2.8	Cu?
10-7	14	7	160	14	10	(43)	4	2.8	Cu?
10-13	12	10	188	15	10	(57)	1	3.6	Cu?
10-25	17	12	208	9	8	(72)	1	5.6	CHECK ENG FOR CU.
11-20	11	6	37	5	4	36	2	1.0	O.K

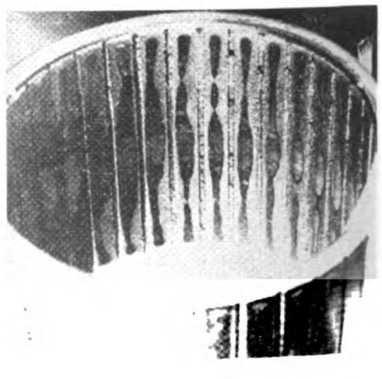
SEVERAL VALVE BRIDGES WERE FOUND IN BAD ORDER

Silver levels were indicative of EMD wrist pin bushing failure. The lead readings did find cylinder assembly with faulty bushing here but will not always do this.

EMD E-8 — SPECTROGRAPHIC ANALYSIS (PPM) — 26

DATE AND POINT SAMPLED	Pb	Si	Fe	Cr	Al	Cu	Sn	Ag	Remarks
11-24-55	3	5	54	7	6	40	6	4.2	
11-30	5	8	70	10	11	45	1	14	
12-2	3	1	52	8	4	38	2	(27)	
12-7	3	1	67	1	2	39	2	(32)	LEAD ENGINE
12-21	3	1	83	2	1	45	1	24	
12-30	8	6	92	6	8	48	3	28	
1-8	4	8	44	5	10	25	1	10	

#9 WRIST PIN BUSHING CORRODED AND SHELLING.



Aluminum indicated scoring of piston in this Alco diesel engine. The iron concentration was high at the same time but the laboratory called for piston inspection.

ALCO — SPECTROGRAPHIC ANALYSIS (PPM) — 28

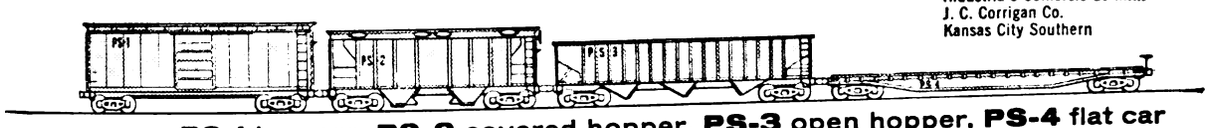
DATE AND POINT SAMPLED	Pb	Si	Fe	Cr	Al	Cu	Sn	Ag	Remarks
12-12-55	3	3	19	1	1	2	4		
1-16-56	7	9	30	2	15	4	3		
2-17	9	(17)	(25)	2	(96)	11	1		INSPECT PISTONS IN SHOP
2-20	14	(24)	(42)	1	(168)	15	1		

#2 ALUMINUM PISTON SHOWING BLOWBY IN RING BELT & HEAVY SCORING.

PS-1
PS-2
PS-3
PS-4

Relied on by:

Akron, Canton & Youngstown
Alabama Power Co.
Amer. Smelt. & Ref. (Mexico)
American Sugar Refining
Ann Arbor Railroad
Atchison, Topeka & Santa Fe
Atlanta & West Point
Baltimore & Ohio
Bangor & Aroostook
Bessemer & Lake Erie
Birmingham Southern
Boston & Maine
Maine Central
Buffalo Creek R.R.
Canadian National
Canadian Pacific
Central Soya
Central of Georgia
Central R. R. of New Jersey
Chesapeake & Ohio
Chicago, Burlington & Quincy
Chicago & Eastern Illinois
Chicago & Illinois Midland
Chicago & North Western
Chicago Great Western
Chgo., Milw., St. Paul & Pac.
Chgo., Rock Island & Pacific
Chgo., St. Paul, Minn'pls & Omaha
City of Chicago
Clinchfield
Colo. Mill & Elevator Co.
Columbus & Greenville
Copper Range
Delaware & Hudson
Delaware, Lackawanna & West'n
Denver & Rio Grande Western
Detroit, Toledo & Ironton
Duluth, Messabi & Iron Range
Duluth, So. Shore & Atlantic
Elgin, Joliet & Eastern
Erie
Escanaba & Lake Superior
Ferrocarril Del Pacifico
Florida East Coast
Ft. Dodge, Des Moines & South'n
General American Trans.
Georgia Railroad
Western Railway of Alabama
Grand Trunk Western
Great Northern
Green Bay & Western
Gulf, Mobile & Ohio
Illinois Central
Industria e Comercio de Min.
J. C. Corrigan Co.
Kansas City Southern



PS-1 box car, **PS-2** covered hopper, **PS-3** open hopper, **PS-4** flat car

Lake Superior & Ishpeming
Lancaster & Chester
Lehigh Valley
Lehigh & New England
La Salle & Bureau County
Louisville & Nashville
Maine Central
Minn'pls, Northfield & South'n
Minneapolis & St. Louis
Mississippi Central
Missouri-Kansas-Texas
Monon
National Sugar Refining
Nashville, Charleston & St. Louis
New Haven
New York Central
N. Y., Susquehanna & Western
Nickel Plate
Norfolk & Western
North American Car Co.
Northern Pacific
Oliver Mining Co.
Pennsylvania
Phila. Qtz. of Cal.
Pittsburgh & West Virginia
Richmond, Fred'bg & Potomac
Rutland Ry. Co.
Santos a Jundiai
St. Louis-San Francisco
St. Louis Southwestern
Savannah & Atlanta
Seaboard Air Line
Southern Pacific
Southern Railway
Tennessee Central
Texas-Mexican
Toledo, Peoria & Western
Union Pacific
Union Railroad
U. S. Army
U. S. Navy
U. S. Trans. Corps
U. S. War Department
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Wabash
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from the experience of the world's largest carbuilder

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Standardized cars get unusual strength from design, not merely from costly weight. And long runs of like cars allow full use of modern mass production techniques. The result and advantages of standardization: better freight cars with longer life, lower maintenance and reduced first cost.

The worth of P-S Standardized Freight Cars is proved by more than 110,000 units purchased and put on order by eighty-seven shipper-conscious railroads and sixteen other users. From 1946 to 1957, one-fourth of all U. S. box cars built have been PS-1 Standardized Box Cars.

And in recent years, Pullman-Standard has added the PS-2 Covered Hopper, PS-3 Open Top Hopper and PS-4 Flat Cars to its standardized line. Acceptance of these cars, too, has been outstanding.

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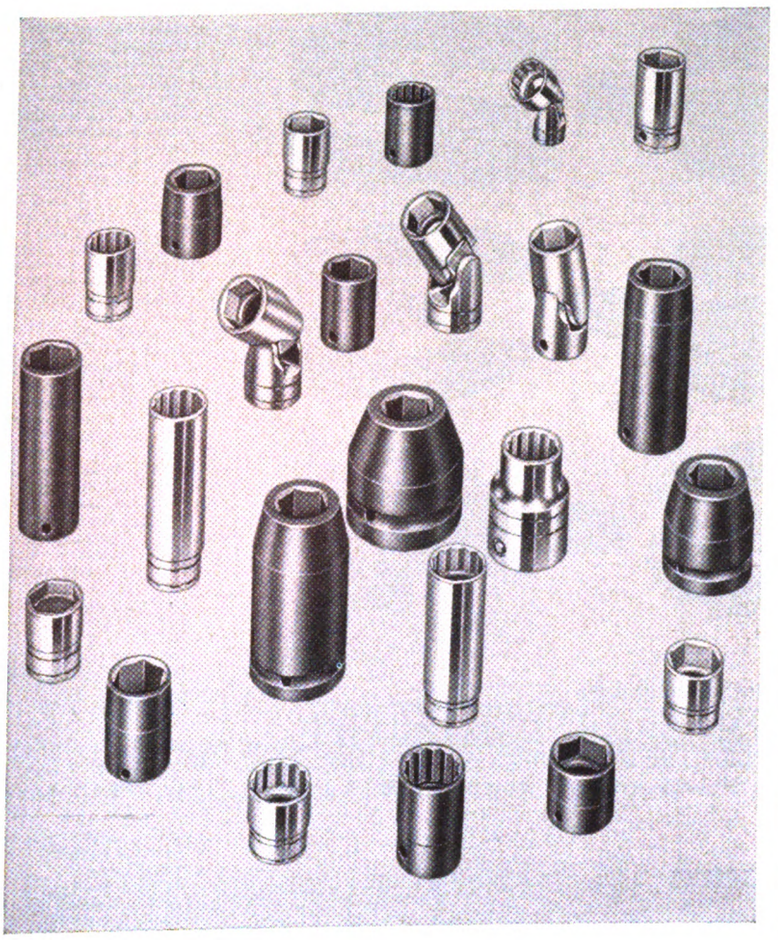
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

what? all these Snap-on* sockets to drive just one size nut?



yes — AND HERE'S WHY: Every ¾-inch socket shown here solves a particular railroad nut-running problem. *Snap-on* makes this variety of ¾-inch hex wrench sockets and many more sizes and styles to give you just the one you need to match the job you have to do. Standard length, bolt clearance length, magnetic, Flexockets, power, power-impact and thin-wall types let you choose the socket to do your job faster and more efficiently, with less breakage.

ASK YOUR Snap-on MAN — If you have a maintenance problem involving special socket design or application, or any other question on tools, talk it over with your *Snap-on* man. He is a specialist who devotes all his time to railroad application of *Snap-on* tools. Write for free catalog of special railroad tools.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
Railroad Division
8130-A 28th Avenue • Kenosha, Wisconsin

SUPPLY TRADE NOTES

(Continued from page 10)

dent and director of American Brake Shoe Company, has overall responsibility for the new division. He was formerly president of both Ramapo and National Bearing Division.

Stephen S. Conway, a Brake Shoe vice-president and president of the Brake Shoe & Castings Division, has been named president of the new Railroad Products Division. *Eads Johnson, Jr.*, president of Southern Wheel Division, is vice-president, sales. *Roy L. Salter*, first vice-president of Southern Wheel Division, has charge of the production department. *Raymond A. Frick*, vice-president, Brake Shoe & Castings Division, is assistant vice-president of production. The engineering department is headed by *Rosser L. Wilson* as vice-president. Mr. Wilson has been director of mechanical engineering at the Mahwah research center and vice-president and chief engineer of Brake Shoe & Castings Division.

Within the new Railroad Products Division, four staff product managers supervise the lines of products offered by each of the former divisions. They are Joseph P. Kleinkort, for the Racor line of trackwork and specialties; John F. Ducey, Jr., brake shoe product line; Daniel C. Poor, wheel products; and Harry E. Connors, bearing products.

Three regional sales areas are being established. *Sam R. Watkins* has been named head of eastern region sales at New York; *Ralph L. Robinson*, central region sales at Chicago; and *Westlev C. Muller*, western region sales at San Francisco.

■

MORTON MANUFACTURING COMPANY.—*Walter M. Klopsch*, plant manager at Libertyville, Ill., has been appointed to the newly created position of director of engineering, Chicago.

■

SKF INDUSTRIES, INC. — *Stuart H. Smith*, general sales manager, has been elected vice-president, sales.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Frank K. Mitchell* has been appointed consultant and *Walter W. Matzke*, assistant manager, technical services, railway division. Mr. Mitchell was formerly assistant vice-president, equipment, New York Central, and Mr. Matzke, assistant superintendent motive power, Chicago & North Western.

■

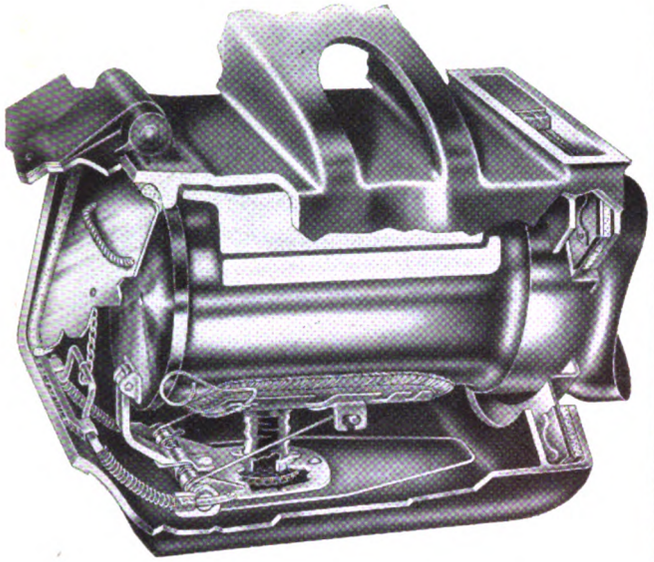
AJAX-CONSOLIDATED COMPANY. —*Seaboard Sales Corporation* has been appointed to handle sale of its products in the Northeast.

■

ALLEGHENY LUDLUM STEEL CORPORATION. — *Harvey B. Lucas* and *John H. Snedeker* have been appointed representatives, Northwest Coast area.

Obituary

F. W. LEWIS, engineering assistant to president, Chicago Railway Equipment Company, died at his home in Chicago on November 13.



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For Freight Car Journals

- Positive mechanical delivery of oil of any viscosity in sufficient quantity to afford bath lubrication.
- Performance unaffected by heat or cold.
- Requires no attention other than additional oil as needed.
- Distributor part AR-1 renewal at 3-year intervals.
- Life of other parts unlimited.
- Eliminates hot boxes from usual causes.
- Reduces frictional resistance.
- Increases bearing life.

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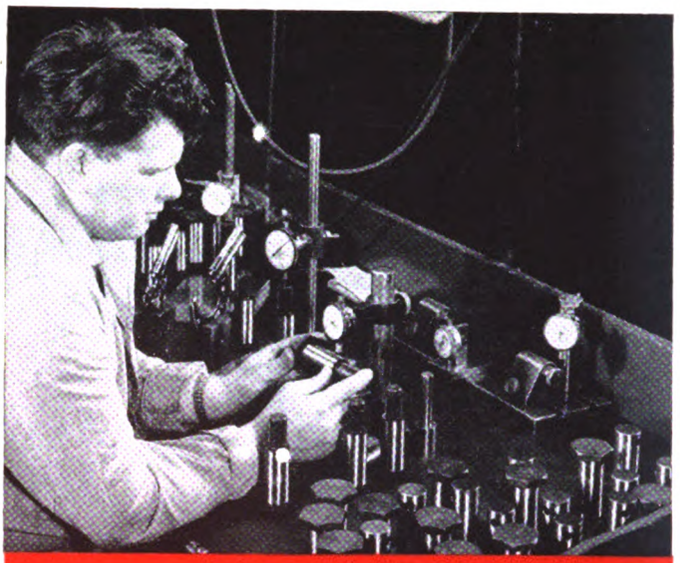
AR Type Lubricator for freight car journals in use since 1952.

More than 5,000 car sets have been sold; more than half of these have been in interchange service since 1953.

HENNESSY LUBRICATOR CO., Inc.

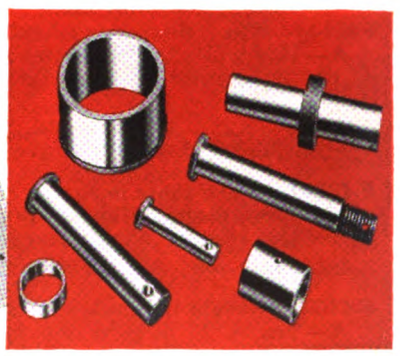
605 Guilford Ave. Chambersburg, Pa.



WHEN A THOUSANDTH OF AN INCH MEANS A MILLION MILES

The man in the photo is inspecting an Ex-Cell-O Railroad Pin to make sure it conforms to rigid standards, a tradition at Ex-Cell-O for 25 years. A fraction off in diameter and this pin flunks the test.

Extraordinary care in every step of manufacturing adds extra safety and extra mileage in every hardened and ground steel pin and bushing. A tough, ductile core withstands vibration, while a deep, hard case that is precision ground resists wear and the abrasive effect of substances from the roadbed. This combination gives bonus years of service — often up to a million miles of wear. One of the reasons why over 200 railroads and equipment builders prefer pins and bushings bearing the symbol, XLO.



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RAILROAD DIVISION, EX-CELL-O CORPORATION, DETROIT 32, MICHIGAN

QUESTIONS and ANSWERS

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Bulletin 1706, Sec. 104-A, Page 6.

F479-Q—What should be the action at a railroad crossing?
A—When approaching a crossing, throttle should be moved to notch *3* or below, and kept in that position until all locomotive units have passed over the crossing.

F480-Q—Why is this necessary?
A—To minimize possibility of traction motor flashovers because of brushes being jolted off the commutator.

F481-Q—When should a locomotive not be operated through water?
A—Do not operate a locomotive through water more than 4 inches above the rail.

F482-Q—What is the permissible speed when operating through water?
A—Not to exceed 3 MPH.

F483-Q—What should be done after passing through water?
A—Snap off generator field switch, move reverse handle to *OFF* and open throttle to 4th notch for about 10 minutes.

F484-Q—Why is this action advisable?
A—This will allow the water to be dried off the traction motors.

Changing Ends

F-485-Q—When about to change ends, what should be done with the controls, before leaving the cab?
A—The selector handle should be moved to *off*, the throttle to *idle*, and the reverse handle removed.

F-486-Q—Should the brakes be applied?
A—Yes. A 20 lb reduction should be made.

F-487-Q—Should the brake valve then be cut out?
A—Yes. The brake valve cut-out cock must be closed.

F-488-Q—In what position should the Rotair valve be placed?
A—The Rotair valve should be moved to *lap* position.

F-489-Q—What other action involving the air brake should be taken?
A—Both brake valve handles should be removed.

F-490-Q—What do you do at the engineer's breaker panel?
A—Snap *off* control, generator field and fuel pump at engineer's breaker panel.

F-491-Q—What do you do at the electrical cabinet
A—Snap off dynamic brake, electro-pneumatic brake and train control breakers.

New Leading Cab

F-492-Q—What do you do when boarding the leading cab?
A—Snap on fuel pump, control and generator breakers at engineer's breaker panel.

F-493-Q—What then should be done?
A—Snap on dynamic brake, electro-pneumatic brake and train control breakers on electrical cabinet.

F-494-Q—What else do you do in connection with the dynamic brake?
A—Check for the correct position of the dynamic brake unit switch.

F-495-Q—Where is the dynamic brake unit switch located?
A—Behind the engineer's seat.

F-496-Q—What should now be done at the air brake equipment?
A—Both brake valve handles should be inserted.

F-497-Q—What should be the position of the Rotair valve on the new leading cab?
A—*Pass* or "FRGT" position, as required.

F-498-Q—What next should be done?
A—Full independent brake should be applied and the brake valve cut out cock opened.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Manual 2310, Page 222.

Operation over Railroad Crossings.

G560-Q—How should the throttle be handled in this case?
A—The throttle should be reduced to the 5th notch before reaching crossing and left reduced until all units are over crossing.

G561-Q—What benefit may be derived from this method of handling throttle?
A—This will reduce arcing from brushes to motor commutator.

Operating B Unit with Hostler's Control

G562-Q—Is operation at the hostler's station the same as an A unit?
A—Yes.

G563-Q—Where are the push button switches located?
A—Beside the controller.

(*Continued on page 68*)

Being interviewed is H. A. Fuggiti, Acting Senior Development Engineer

"Here's where the heavy slugs of power come from"

At the Exide Laboratories — **Reporter:** Just exactly what part of the battery is that, Mr. Fuggiti?

Fuggiti: This is the Exide-Ironclad positive plate. And in any battery, power reserve is governed by positive plate area.

Reporter: Then do you mean that Exide-Ironclad Batteries have *more* positive plate area?

Fuggiti: Exactly. You can see that here. The cylindrical power tubes are arranged in a row. So the semicircular sides give an effective plate area one-third more than the plate size.

Reporter: How does that increase power reserve?

Fuggiti: Because there's a bigger working surface of battery plate exposed to the electrolyte. Power response is faster.

Reporter: What does this mean in battery performance?

Fuggiti: It means the battery can provide power to spare for peak power loads as well as a dependable source for continuous loads.

Reporter: Obviously this is an important feature of the Exide-Ironclad Batteries.

Fuggiti: Yes it is, but it's just one of many engineering details that contribute to their long life and high capacity.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

QUESTIONS AND ANSWERS

(*Continued from page 66*)

G564-Q—Where is the brake valve cut-out cock and the bell valve located?
A—The brake valve cut-out cock is below the brake valve and the bell valve is a globe valve near the controller.

G565-Q—What transition is available?
A—Only No. 1 transition is available.

G566-Q—What does movement of the reverse lever automatically accomplish?
A—Movement of the reverse lever automatically places the locomotive in No. 1 transition.

G567-Q—Will operation of the B unit controls, operate all units joined to it?
A—Yes.

G568-Q—What must be done when securing the hostler control?
A—All push buttons must be pulled out, controller and reverser pinned, and the brake valve cut out.

G569-Q—Why must this be done?
A—Because these items can affect operation at any other station or cab.

Running Through Water.

G570-Q—What part of the locomotive should not, under any circumstances, come in contact with water?
A—The bottom of traction motor frames.

G571-Q—What is the maximum speed allowable when passing through water?
A—Two to three miles per hour.

G572-Q—At what height above the top of the rails is water likely to cause damage to the traction motors?
A—Water any deeper than 3 inches above the top of the rails.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W177-Q—With the application valve unseated, what takes place?
A—Main reservoir air in *a* is free to flow to the brake cylinders through a large capacity opening, providing an adequate rate of brake cylinder build-up for the large brake cylinder volume.

W178-Q—What additional ports are connected at this time?
A—Cavity *t* in graduating valve *28* connects ports *r* and *s* in the equalizing slide valve and by the same movement ports *r* and *s* register with *h2* and *1* in the seat.

W179-Q—What communications are thus established?
A—Application cylinder and safety valve are connected.

Pamphlet 5046-15 Page 39

W180-Q—When does the brake valve assume Lap position in reality?
A—Not until the brake pipe exhaust has been closed by the equalizing discharge valve.

W181-Q—Describe the action at the equalizing portion of the distributing valve after the brake pipe reduction has stopped.
A—Air from the pressure chamber continues to flow to the application cylinder and chamber until pressure chamber pressure is reduced below that in chamber *P* and the brake pipe enough to cause piston to move graduating valve to the left.

W182-Q—How long does this movement continue?
A—The graduating valve continues to move to the left until stopped when the shoulder on piston stem strikes the right end of equalizing slide valve.

W183-Q—What connection is then closed?
A—The graduating valve blanks port *z*, so no more air can flow from pressure chamber to the application cylinder and chamber.

W184-Q—What other flow of air is stopped by the graduating valve?
A—It has also closed port *s*, cutting off communications to the safety valve.

W185-Q—Why is it essential to cut off flow of air to the safety valve in Service Lap position?
A—So that any possible leak from the safety valve cannot reduce application cylinder pressure and thus affect the pressure in brake cylinders.

W186-Q—Describe the operation at the application portion of the 6-KR distributing valve after the equalizing portation has assumed Lap position.
A—Flow of main reservoir air past application valve *68* to the brake cylinders continues until pressure at the right of application piston 10 slightly exceeds application cylinder pressure at the left of the piston. Then the piston will move to the left.

W187-Q—What then takes place?
A—Springs then close application and pilot valves, preventing further flow of air to the brake cylinders.

W188-Q—What serves to prevent continued movement of the application piston to the left?
A—A greater differential of pressure on the application piston is required to move the piston and exhaust valve than the piston alone; therefore the piston movement stops when it comes in contact with the exhaust valve.

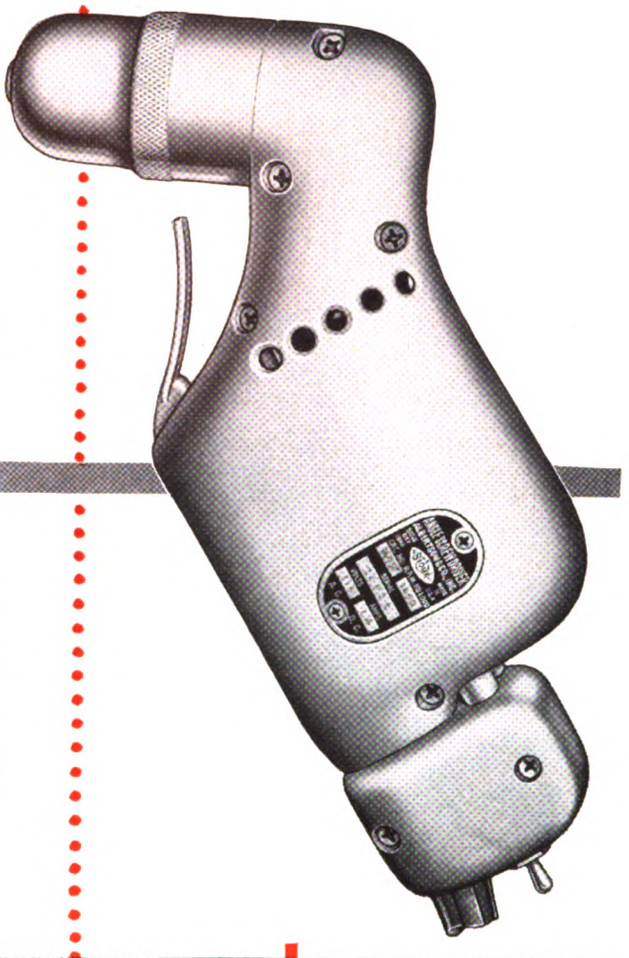
W189-Q—What are the pressures at this time?
A—At this point the exhaust valve still blanks exhaust port Ex., and pressures on both sides of the piston are balanced.

W190-Q—What movement takes place if brake cylinder pressure is reduced through leakage?
A—The piston will move to the right and open the pilot valve or application valve far enough to restore brake cylinder pressures to approximately that of the application cylinder. The piston will then be returned to Lap position.

NEW

SIOUX

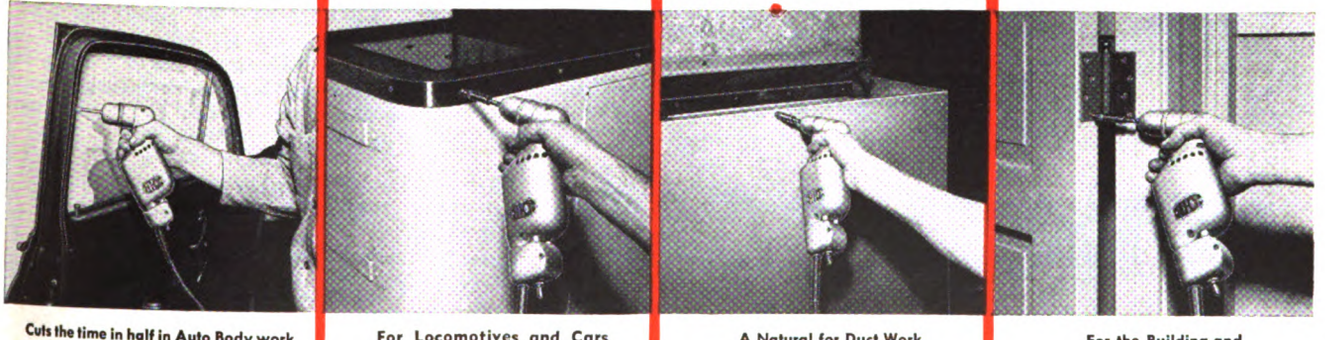
ALL-ANGLE ELECTRIC SCREWDRIVER



Here is really an amazing tool. It will do everything the conventional designs will do, and much more. It will work in extremely close quarters where there wouldn't be clearance for the others.

It will drive, set and remove wood screws, self tapping screws, lag screws, and machine screws and nuts. An optional adjustable clutch may be set to provide uniform tightness, or the operator can control tightness with hand pressure. Available bits include Standard Screw Driver, Phillips, and Socket Wrenches.

It will deliver the long, trouble-free Service everyone expects of a SIOUX Tool. Look for SIOUX under "Electric Tools" in the yellow pages.



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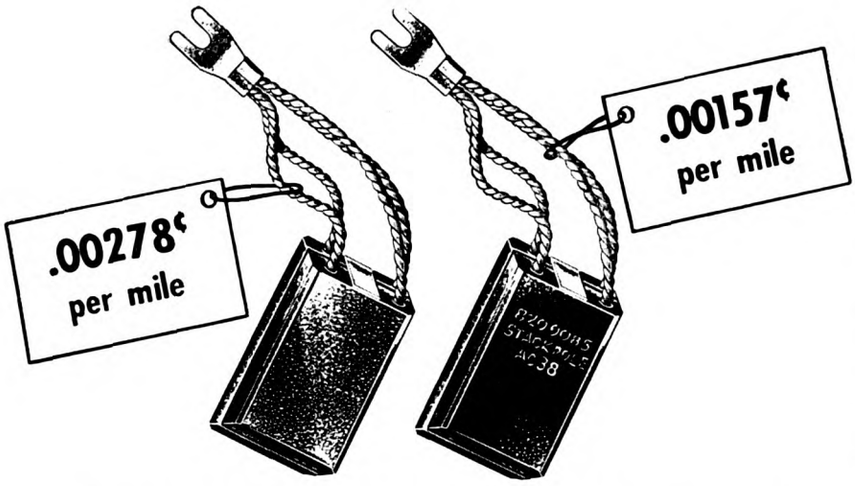


What if brush prices included commutator reconditioning costs?

Long diesel-electric brush life is highly important. By no means, however, is it the only factor by which brush efficiency should be judged.

Let's assume that brush type A has an average life of, say, 50,000 miles. Brush type B lasts 100,000 miles. Therefore brush A requires six changes in the usual diesel reconditioning span of 300,000 miles. Meanwhile, brush B is only changed three times.

But Type A is kind to commutators! Things run smoothly the full 300,000 miles. Type B, while lasting longer, bar burns the commutator to the extent that an extra reconditioning is required before the 300,000 mile mark is reached.

Brushes cost about $12 per set versus approximately $400.00 for commutator reconditioning. Thus the result is easy to figure: *The true cost of type A brushes has been about .00157¢ per mile as compared to the 77% higher cost of .00278¢ per mile for brush type B.*

While only a rough example, such figures show why Stackpole engineering is based on the firm belief that smooth commutation is every whit as important as long brush life—and that the best brush for most uses is the one that strikes a happy medium between these two sometimes incompatible factors.

STACKPOLE
electrographite
BRUSHES

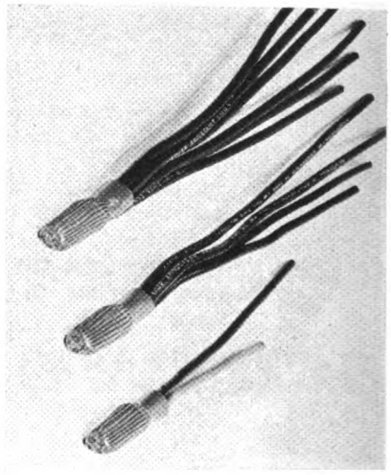
...They help keep diesels rolling... *profitably*

STACKPOLE CARBON COMPANY, *St. Marys, Pa.*

EQUIPMENT

(Continued from page 18)

of 95 centipoises with a solids content of 22 per cent, suitable for brushing as supplied. *B. F. Goodrich Industrial Products Company, Adhesives Division, Dept. RLC, Akron, Ohio.*



Pre-Insulated Wire Connector

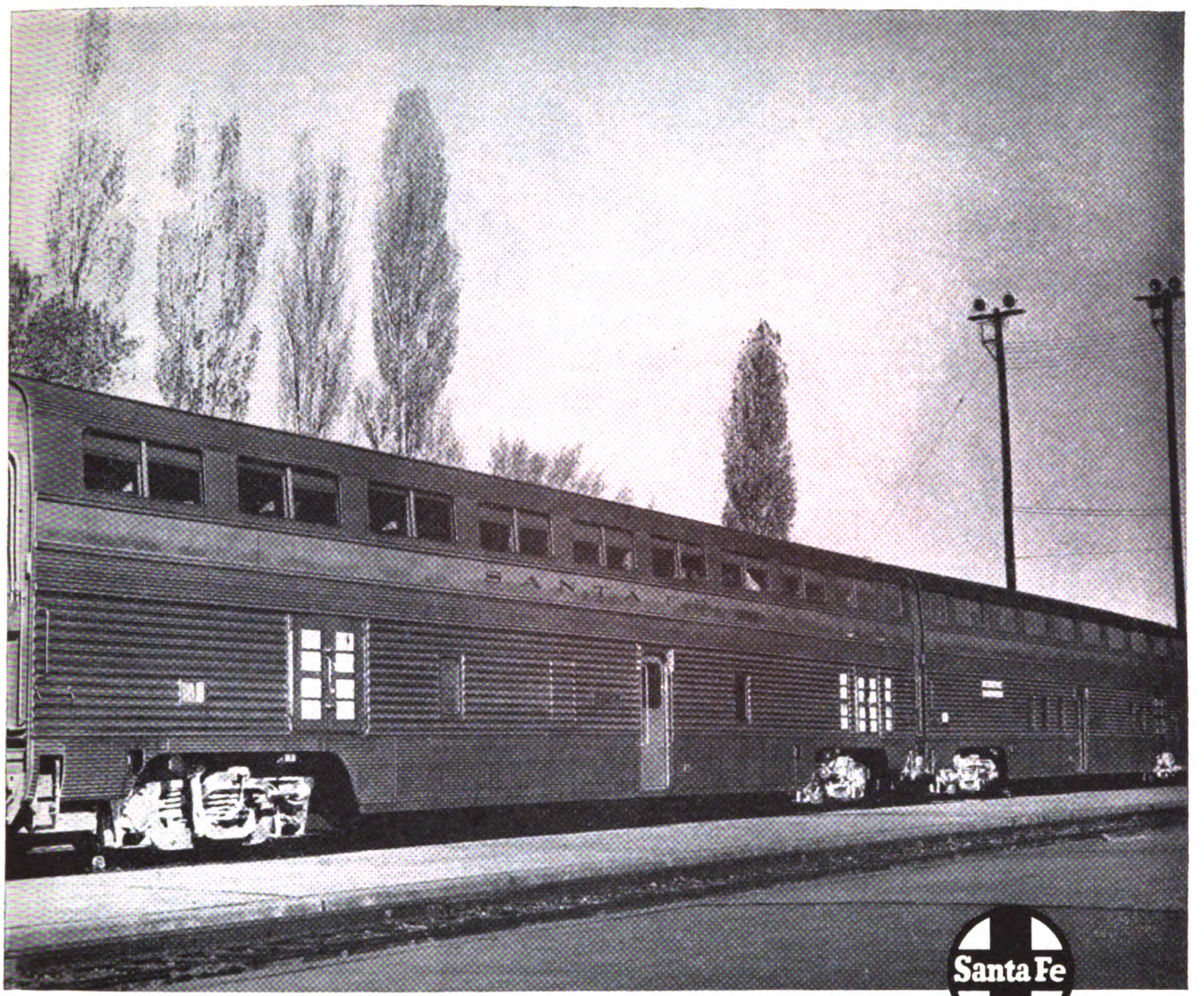
This spring type electrical connector, Scotchlok brand R, makes solderless, ready-insulated splices in one step without the use of tools. It is said to provide a vibration-resisting pigtail splice that holds regardless of thermal or mechanical changes. It is approved by the Underwriter's Laboratories in meeting all requirements for high- and low-voltage building wiring, 1000 volts maximum, and 600 volts maximum fixture wiring.

The connector consists of a cone-shaped coil spring within a steel shell to prevent crushing in crowded junction boxes. Its vinyl insulating jacket features a triangular cross-section for better grip during application. Included is a skirt at the bottom to prevent flashover and protect the wires. The connectors are suitable for use on wire sizes from #10 to #16 AWG in 64 possible combinations. *Minnesota Mining & Manufacturing Co., Dept. RLC, 900 Fauquier street, St. Paul 6.*

Overheat Detector

This mercury thermal switch, with its built in permanent contact, is isolated in the housing to insure immunity to vibration and shock. It was produced to detect overheating of generators, alternators, bearings, etc.

The indicator can be furnished to give an alarm at a single temperature or at a multiplicity of temperatures. Application to existing apparatus is accomplished by providing a tapped hole to take the detector. Many types of mountings are available for



New Look for *El Capitan*

Passengers will soon find even greater comforts and attractions on Santa Fe's El Capitan. For years this luxurious all-chair train between Chicago and the West Coast has been a favorite with the traveling public. Now the proud train is to have a new look, and the look is more than skin-deep. It's all the way through.

Outstanding feature of the new El Capitan will be ultramodern two-level cars built by the Budd Company of Philadelphia. The consist of each train will be seven chair cars, with all seats on the upper level; a diner with the entire upper deck devoted to table space; and a dome-type lounge car that offers unlimited panoramic views of the landscape. All cars are fifteen feet, six inches high — two feet higher than conventional equipment.

Among the basic items of running-gear are Bethlehem wrought-steel wheels and forged-steel axles. Needless to say, these Bethlehem products are fashioned to the highest standards of workmanship; they are worthy components, like everything else in the cars. We at Bethlehem are happy indeed at this association with El Capitan, a famous train, and with the Budd Company, master carbuilders.

BETHLEHEM STEEL

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

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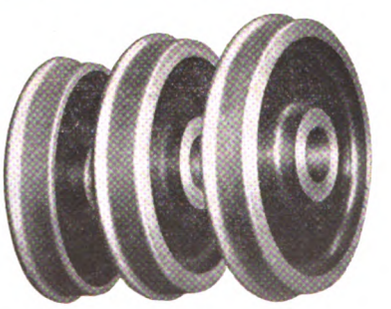
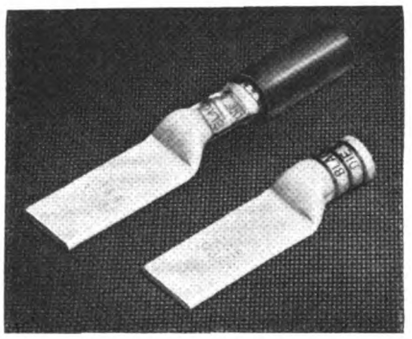


applications without modification of present equipment.

Weight of the unit is 0.065 lb. Ohmic values of the resistor is 800 ohms, drawing a current of 35 ma. It is 1.812 in. long and requires a regulated voltage supply of 28 volts dc. *Vapor Heating Corporation, Dept. RLC, 80 East Jackson blvd., Chicago 4.*

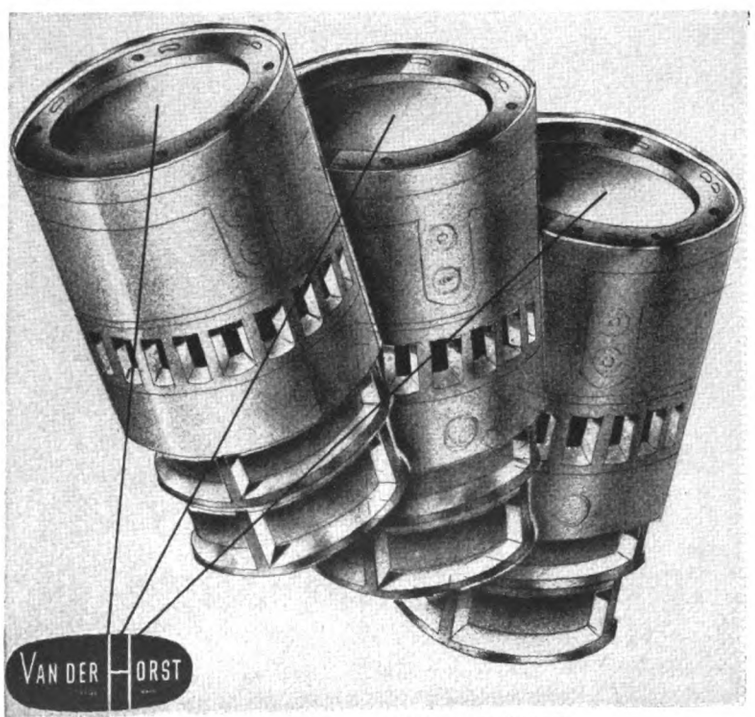
Adaptable Lug



Inventories of electric locomotive lugs can be reduced by stocking these adaptable blank tongue compression lugs for flexible copper conductors. The suggestion by the manufacturers is based on these features: The lugs terminate conductors from 37/24 to 1925/24 on all diesel electric locomotives. Available in straights, 45 deg and 90 deg angles, they are easily bent to other angles, any holes required in the tongue drilled, and any excessive length cut off.

Lugs for sized 37/24 to 550/24 are color keyed to dies in a compact TBM 5 installation tool. Correct choice of an installation die for a lug is quickly made by matching their coors. The TBM 5 hand tool compresses the lug and conductor into a joint of high tensile strength and low electrical resistance. These blank tongue compression lugs are wrought copper with an electro tinplated finish. *Thomas & Betts Co., Dept. RA, 36 Butler street, Elizabeth, N.J.*

5 *big advantages of*



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*SparTan Engineering

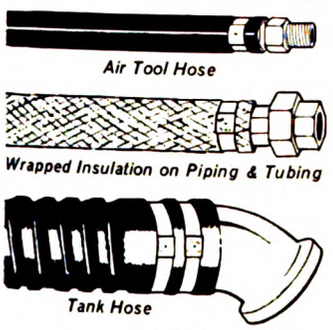
Portable Lube Dispenser

This is a portable, manually-operated gear lubricant dispenser, with a steel cover. It can be clamped in 30 seconds to any standard 25 lb to 50 lb original refinery container. Designed for fast, clean refilling of transmissions, differentials, gear cases, final drives and other components, it includes a follower plate to assure positive prime in handling even the heaviest gear lubricants in any weather, and a 5-ft hose assembly with a curved, non-drip nozzle. Lubricant output is one pint per 10 strokes. It develops 400 lb maximum pressure. This unit is of all-steel construction, rustproofed and finished in baked blue enamel. *Lincoln Engineering Company, Dept. RLC, 5702-14 Natural Bridge avenue, St. Louis 20.*

Discharge Line Check Valve

The Aircheck valve uses ring-plate-design, air-cushion valves with stainless steel valve discs and springs; is arranged in a cast iron or cast steel body to prevent automatically reverse flow and to

Wherever There's Hose . . . You'll Find PUNCH-LOK HOSE CLAMPS



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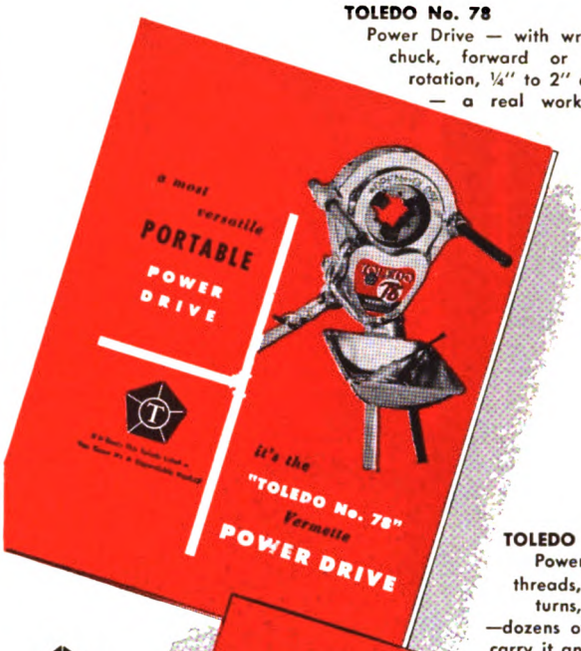

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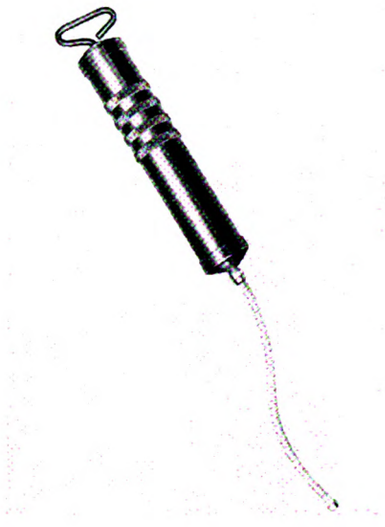
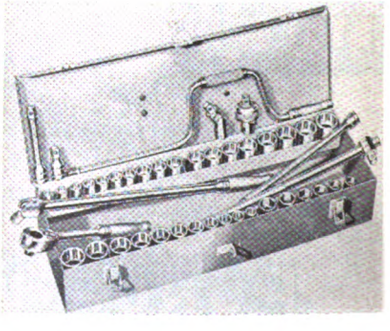
meet pressure requirements with either tapped or flanged connections available.

This valve, placed in the discharge line of air or gas compressors, eliminates the need for stop and safety valves, prevents leakage of pressure through the compressor when off or idling, damps pipe line pulsations, is quiet in operation and easy to maintain, with all parts accessible from outside. *Pennsylvania Pump & Compressor Company, Easton, Pa.*



Suction Gun

This gun will service gear cases, transmissions, differentials and other components, or can be used for transferring any fluid lubricant. A flexible "Linpak" follower, impervious to lubricants, is precision fitted to the barrel. Even when filled to its maximum 18 oz capacity with nozzle held downward, lubricant will not leak out of the gun. The gun is of all-steel construction with rust resistant, gun-metal blue finish. It is supplied with non-drip nozzle and flexible tube. *Lincoln Engineering Co., Dept. RLC, 5702-14 Natural Bridge ave., St. Louis 20.*



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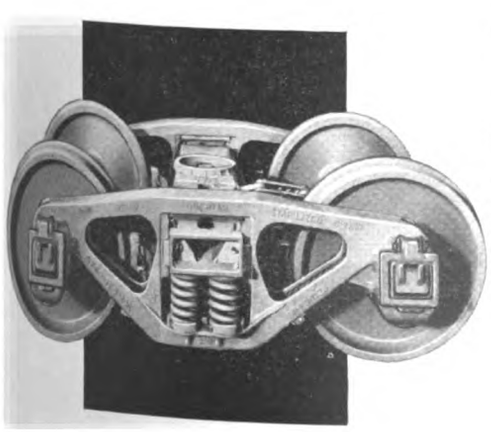
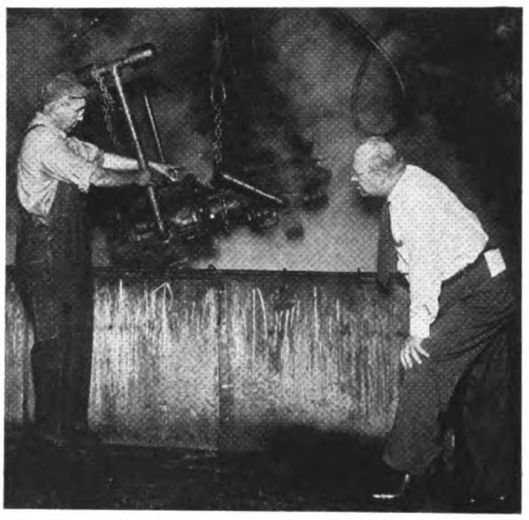


STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

In PARTS CLEANING, too



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No matter what the maintenance cleaning job, there are *genuinely* economical, efficient Oakite materials to help you keep costs down. Get information on these and also up-to-the-minute methods and equipment from 56-page Booklet No. F-8055. Write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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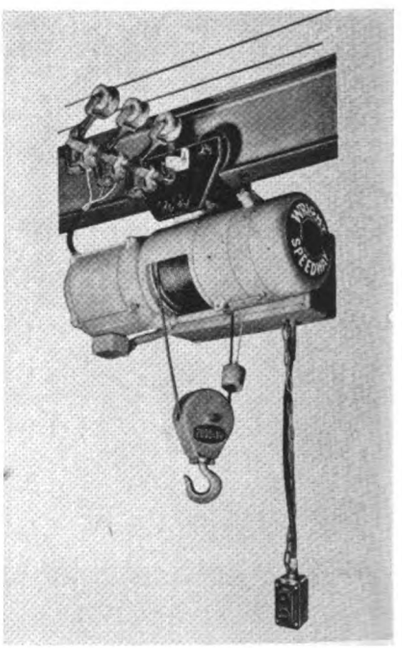
of heat treated alloy steel accommodate a ½-in. square drive, are thin walled for application in close quarters and are chrome-plated.

Included in the set are eleven bolt-clearance-type hex sockets from ½ in. to 1⅛ in.; 18 standard double-hex sockets from ½ in. to 1¼ in.; six single-hex Flexockets from 9/16 in. to ⅞ in. All are in increments of 1/16 in. In addition, there is a 10-in. ratchet handle with adaptor, one 18-in. long nut spinner, a 15-in. sliding "T" handle, universal joint, one 19½-in. long speeder and three extension bars—2, 5, and 10 in. long. *Snap-on Tools Corporation, Dept. RLC, 8028 28th avenue, Kenosha, Wis.*

Metallized Crankshafts

A metal powder, Colmonoy C-250, developed to reclaim worn or scored crankshafts by the metallizing process, is a chromium-nickel powder containing chromium borides. It is said to have an unusually low coefficient of friction, controlled surface porosity and good oil retention properties. It is available in 5-lb containers. *Wall Colmonoy Corp., Dept. RLC, 19345 John R. st., Detroit 3.*



Two-Speed Electric Hoist

This electric hoist, equipped with fractional horsepower 1800/450 rpm motors, provides a fast lifting and lowering speed and a slow, ¼ normal speed, for gentle positioning. According to the manufacturer, this hoist parallels the sensitivity of control of air hoists. The housing of the hoist is designed so that the side and end covers can be quickly unscrewed for the servicing of exposed parts in a

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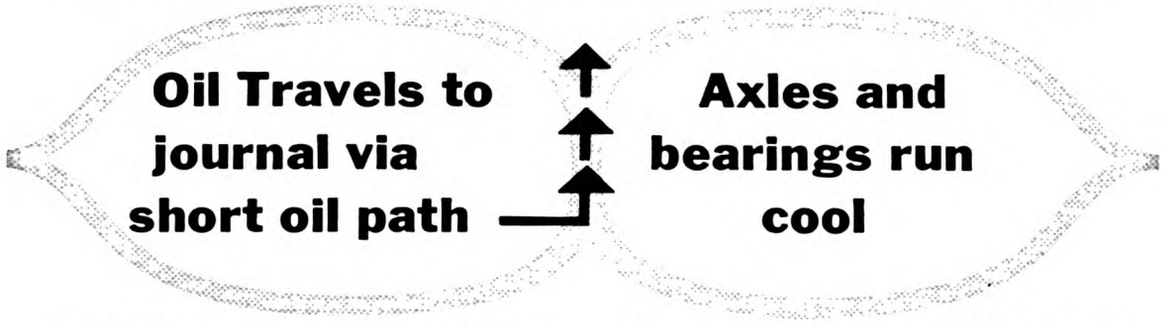

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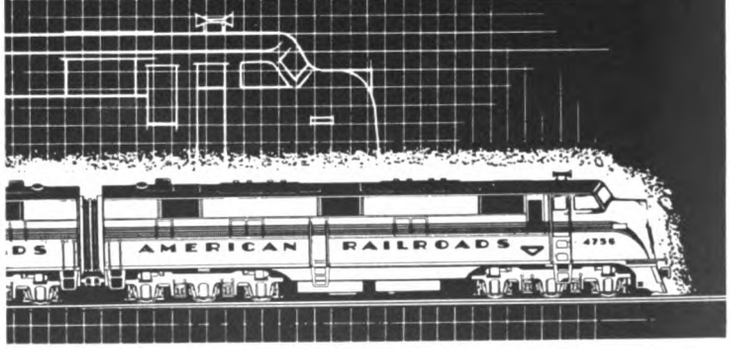

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It's the same with motors and generators. Periodic maintenance of commutators and slip rings is simply low-cost insurance against high-cost replacement, rebuilding and motor failure.

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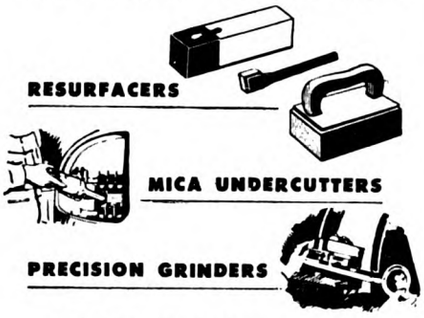

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MICA UNDERCUTTERS

PRECISION GRINDERS

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Ideal Preventive Maintenance gives you everything you need to set up a preventive maintenance program that will save you many times its small cost. NO DISMANTLING OR TAKING EQUIPMENT OUT OF SERVICE WHEN IT'S NEEDED.

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matter of minutes. Two easy adjustments of a set screw compensate for brake lining wear.

Available in parallel mounting, cross mounting, hook mounting and rigid or bolt mounting, the hoist utilizes totally enclosed NEMA specification motors for operation on a-c or d-c. Heat treated alloy steel gears with hardened wearing surfaces are used throughout. They are of the stub tooth 20 deg angle involute gear profile type. The automatic brake, which is immersed in an oil bath, assures uniform operation in varied atmospheres and safe holding of load while in suspension. *Wright Hoist Division, American Chain and Cable Company, Inc., York, Pa.*

General Purpose Detergent

This detergent, "Liqui-Det," contains no soap and is said to go into solution instantly. It suds in hard or soft water, hot or cold. The company states it can be used repeatedly without rinsing, and without causing any build-up of film or discoloration. Concentrations as low as ¼ oz to the gallon of water are being used with good results.

It has been used in diesel cab interiors and is said to remove rubber "burns" from fork-lift tires on concrete. *Oakite Products, Inc., Dept. RLC, 146 Rector st., New York 6.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

MAGNETIC PARTICLE INSPECTION. Fifteen-page booklet gives a broad-scale outline of the Magnaflux-Magnaglo, or dry and wet methods of non-destructive testing of magnetic materials, with pictures of typical common defects that can be detected. Over 50 standard model units, portable and fixed, are available for many different inspection methods and needs; covering a wide range of uses on products, tools, machinery and equipment maintenance, and transportation and service industries. *Magnaflux Corporation, Dept. RLC, 7300 West Lawrence avenue, Chicago 31.*

ABRASIVE CUT-OFF SAWS. Forty-four-page illustrated book describes abrasive cut-machining units. It explains briefly the various types of abrasive cut-off saws. The portable combination cut-off and deburring chop saw. The large Wallace modular cut-off saw, capacity 5-in. standard pipe. The swing type cut-off saw for high production work, and rotating cut-off saw having 12-in. pipe capacity. Also a portable hacksaw and bandsaw. (Write: *Wallace Supplies Manufacturing Co., Dept. RLC, 1300 Diversey Parkway, Chicago 14.*)

LARGE NUTS. 4-page bulletin describes Locknuts, standard nuts, jam nuts, and slotted nuts of standard and special hexagon dimensions. Includes specifications for semi-finished heavy and light hex nuts. (Write: *Security Locknut Corporation, Dept. RLC, 1800 N. 15th avenue, Melrose Park, Ill.*)

SOLDERLESS WIRING. 8-page bulletin, "Solderless Wiring Devices," illustrates, describes and gives sizes and specification data on new time-saving solderless terminals and connectors for crimping to wire extremities. (Write: *Electric Terminals Corporation, Dept. RLC, 2021 Center street, Cleveland 13.*)

STEEL EQUIPMENT. 48-page reference Manual of Steel Equipment (No. 485) analyzes all types of steel shelving, drawers, lockers, work benches and tables, and other storage, store, office, and shop equipment. (Write: *Equipto, Dept. RLC, Aurora, Ill.*)

SILICONES. 12-page 1957 Guide to Dow Corning Silicone Products groups products by usage—water repellents, dielectrics, release agents, etc.—permitting the selection of a material by what it does as well as by what it is. Charts, tables and graphs compare various silicones with the materials displaced. (Write: *Dow Corning Corporation, Dept. RLC, Midland, Mich.*)

ARC RECTIFIERS. Four-page bulletin describes mercury arc rectifiers for steel mills, chemical plants, transportation systems, etc., with cross-sections of typical Allis-Chalmers sealed tube and of a pump evacuated excitron rectifier tube. (Write: *Allis-Chalmers Manufacturing Co., Dept. RLC, 1253 S. 70th St., Milwaukee.*)

PRESSURE GAGES. Four-page bulletin DH-23 features Helicoid line of pressure and chemical gages for use on engines, turbines, blowers, locomotives, compressors, etc., or wherever a gage is subjected to violent pressure pulsations or severe mechanical vibrations. (Write: *Helicoid Gage Division, American Chain & Cable Co., Dept. RLC, 929 Connecticut ave., Bridgeport 2, Conn.*)

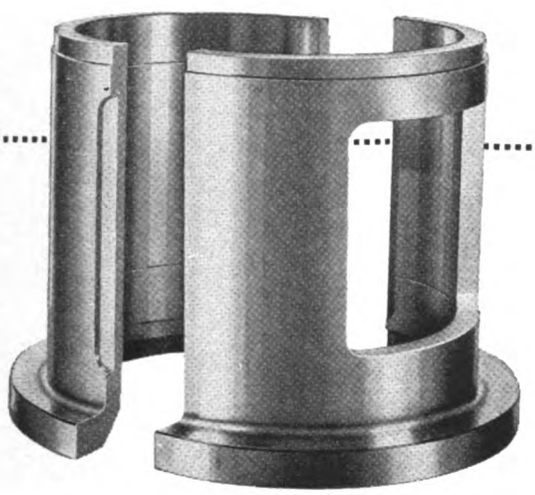
CYLINDER HEAD SERVICE. 8-page booklet describes a service whereby diesel locomotive cylinder heads are reclaimed through the use of a combination of hard-faced valves and Nichrome seat inserts. (Write: *Diesel Reclamation Service Co., Dept. RLC, 479 Broadway, Bedford, Ohio.*)

NOMOGRAM. A Uni-Flo "Nomogram for Finding Outlet Area for Downward Jet of Heated Air" is a simple method for determining the size of grilles and round openings necessary to project the heated air of a given temperature to the floor. (Write: *Dept. 766, Barber-Colman Company, Dept. RCL, Rockford, Ill.*)

Precision Parts by MAGNUS

mean LONGER, SAFER MILEAGE

for Diesel Locomotives



- ***Perfectly mated bearing halves***
- ***Heat-resistant Satco lining metal***
- ***Interchangeable double keeway***
- ***Available for all makes and types of diesel-electrics***

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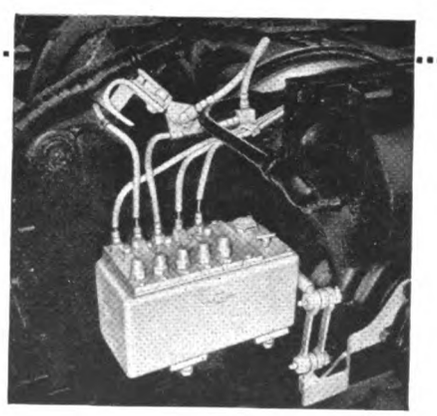
traction motor support bearings for LONGER ROAD LIFE

The extra precision that goes into Magnus traction motor support bearings pays off in longer, trouble-free mileage on the road. Quality control of metal mixes, high precision boring and final testing of mated bearing halves *under load* assure an extra margin of dependability — you can't buy a better bearing.

These Magnus HIGH-MILEAGE bearings are available for replacement on all types and makes of diesel-electric and electric locomotives and MU cars. For the complete facts, get your free copy of Bulletin No. 6000.



D-16 FLANGE LUBRICATOR increases mileage between wheel turnings up to 40%

This new, *more positive* method of flange lubrication not only gives greatly extended wheel life, but substantially reduces shop costs, too. Oil pressure to each flange is positively controlled by six individually adjustable pumps that are gang-operated from a common linkage to the truck frame. Unit operates only when locomotive is moving. Can be used to lubricate center pin wear plate also, if desired. Full 16-pint capacity for extra mileage between refills. Write for complete information.

MAGNUS 391 SAFETY VALVE

for dependable overload protection on diesel locomotive steam generators

This high-precision safety valve is specially made for railroad service on diesel locomotive steam generators. Opening and blowdown pressure adjustments are easily accessible and self-locking. Flexible metallic bellows prevent escape of steam into the generator compartment. Write for full details.

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Metal Corporation

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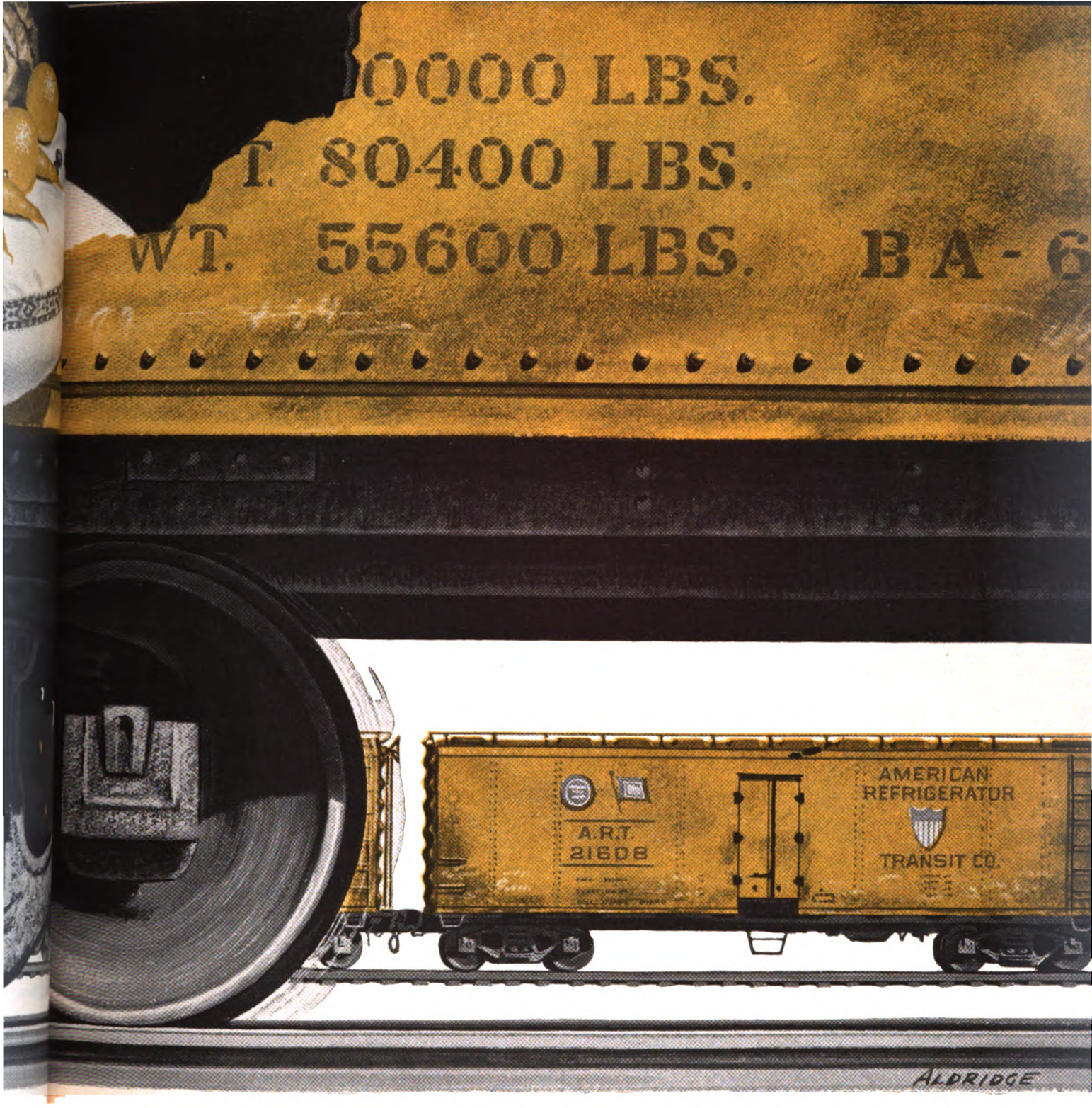
On the A.R.T.
THEY WHET YOUR APPETITE

At any fruit or vegetable counter, the biggest sales-builder of all is the "just-picked" look. That's why the A. R. T. Company has done such a topflight job of providing cars that ride smoothly at higher speeds . . . to bring produce from the orchards and farms to your dinner table safely and quickly.

Is this good service possible only with new cars? Not at all. Older cars—with trucks dating back to the pre-Ride-Control era—are simply brought up to modern riding standards with ASF Ride-Control Packages. Change-over takes only a few minutes and the investment is small—practically nothing, in fact, compared with the way *improved service* retains and *regains* freight revenues.

Safe, prompt arrival of *any* commodity carried on the rails is just as important and desirable as a fresh-looking orange! Further tests on your road will prove how Packages can help you increase *profits* . . . through greater car utilization, better service, fewer damage claims.

Now is the time to make smooth riding another objective of your general repairs program!



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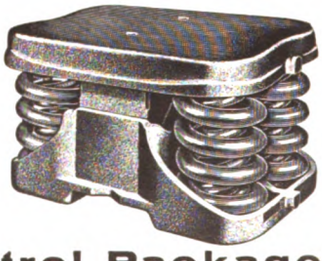
NOW . . . all ASF Ride-Control Packages are fitted with Extended Life Springs

In appearance, these springs look like any standard truck spring . . . but tests prove they average at least 10 times longer life! Ride-Control Packages offer you a quick answer to smoother riding—and an answer to costly spring failures and replacement.



Bring your older cars up to modern riding standards . . . with

ASF Ride-Control Packages

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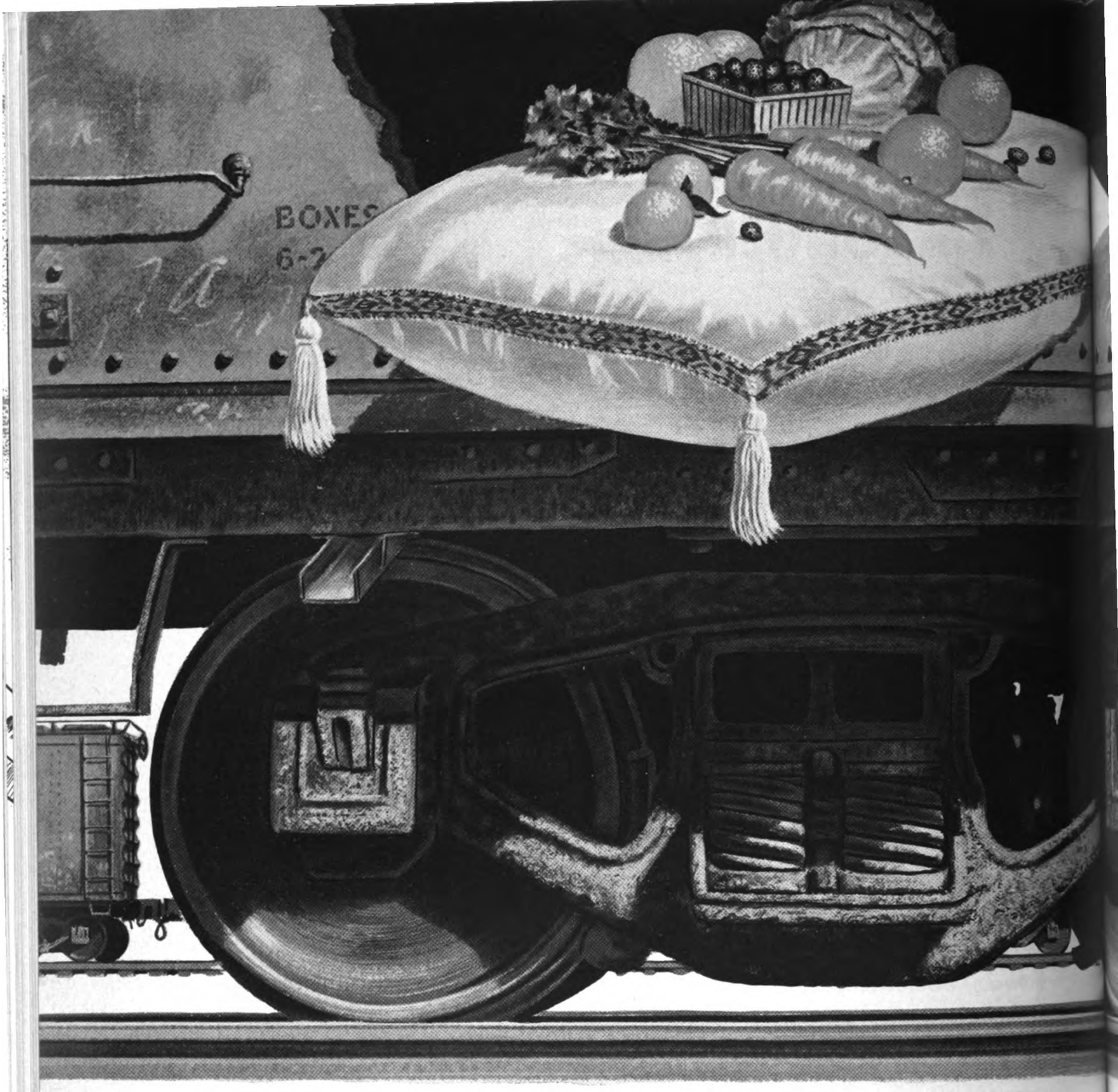

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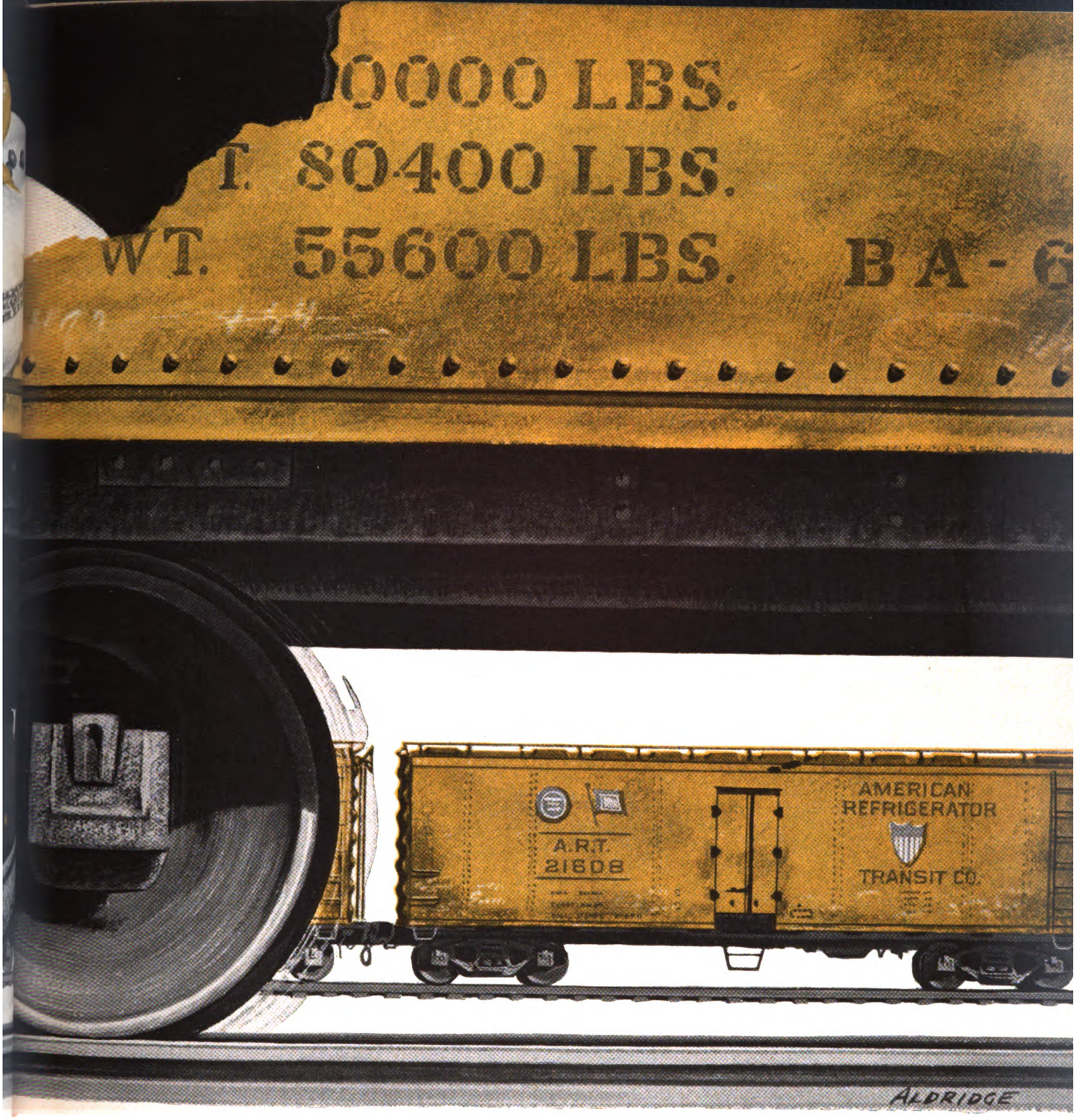

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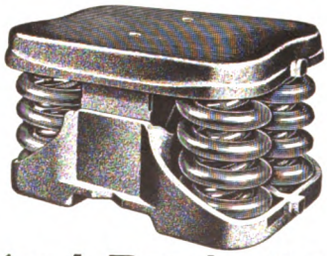

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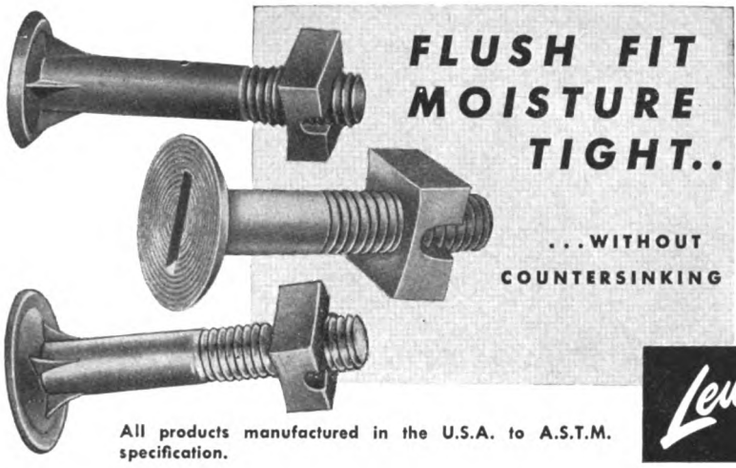

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...WITHOUT COUNTERSINKING

Lewis sealtite car bolts

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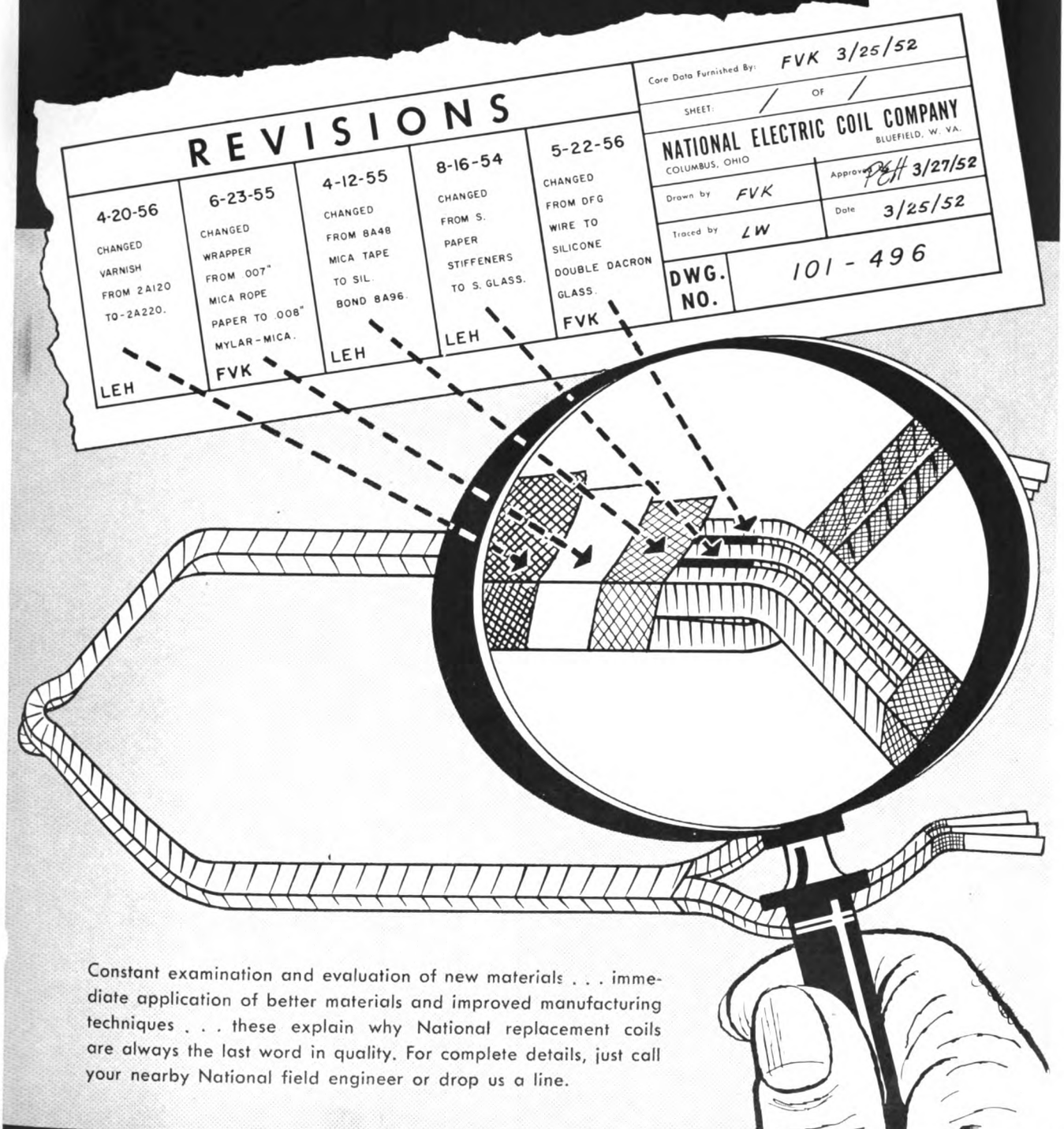


Constant examination and evaluation of new materials . . . immediate application of better materials and improved manufacturing techniques . . . these explain why National replacement coils are always the last word in quality. For complete details, just call your nearby National field engineer or drop us a line.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A. TRADE MARK

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

The taper makes Timken® the only journal bearing that delivers what you expect when you buy a roller bearing

THERE are two major reasons why you put car journals on roller bearings: to end the hot box problem, and to cut operating and maintenance costs to a minimum. The only bearing you can count on to do both is the Timken® tapered roller bearing. It's the taper. Here's why:

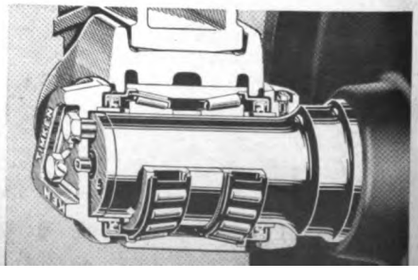
1) NO LATERAL MOVEMENT WITHIN THE BEARING. Because of the taper, there's no lateral movement to pump lubricant through the seal and out of the journal box. Costly lubricant is saved, can't leak onto the tracks to cause troublesome wheel slip on diesel locomotives. And no lateral movement means no scuffing of rollers and races to shorten bearing life.

2) POSITIVE ROLLER ALIGNMENT. The taper in Timken bearings holds the ends of rollers snug against the cone rib, where wide area contact keeps them properly aligned. Rollers can't skew to upset full line contact, shorten bearing life.

Unlike costly "crutch" devices that merely attempt to improve friction bearing performance, Timken bearings remove the very *cause* of hot boxes—the friction bearing itself. And they deliver maximum operating and maintenance savings, too. Timken bearings cut terminal bearing inspection time 90%, reduce lubricant cost as much as 95%. The new Timken heavy-duty type "AP" (All-Purpose) journal bearing assembly will go three years without adding lubricant.

So be sure you get what you pay for when you switch to roller bearings to end the hot box problem, and cut operating and maintenance costs to the bone. Get Timken *tapered* roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱
BEARING TAKES RADIAL ↓ AND THRUST →▯← LOADS OR ANY COMBINATION ✳



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THE BEARING YOU TRUST

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RAILWAY LOCOMOTIVES AND CARS

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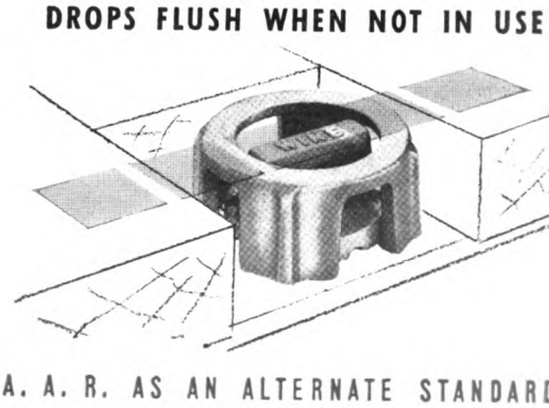

APPROVED BY A. A. R. AS AN ALTERNATE STANDARD

THE WINE RAILWAY APPLIANCE CO. TOLEDO 2, OHIO

THESE BOTTLES CONTAIN the amount of ash left from burning four different diesel fuel additives—in cost-equivalent amounts that would be needed to treat 1,000 gallons.

Look . . . no ash left by diesel fuel additive!

Metallic additives in diesel fuel leave an ash residue after burning. Cumulatively, ash deposits are a potential sparking hazard.

This is because the metallic residues may bind together the carbonaceous particles formed in the exhaust ports and the exhaust barrel and reduce their glow temperature. Under heavy load, these particles are likely to be blown from the stack in an incandescent state. That's the hazard.

Ashless Du Pont additive

You can easily eliminate this cause of sparking by using an ashless additive. Being nonmetallic, Du Pont Fuel Oil Additive No. 2 (FOA-2) leaves virtually no ash.

The bottle on the left contains the almost invisible amount of ash left after burning an amount of FOA-2 that would protect 1,000 gallons of fuel oil—at a concentration of 20 pounds per 1,000 barrels. The other bottles contain the ash left after cost-equivalent amounts of other additives were burned.

Prevents injector-sticking

Because it is an excellent stabilizer and dispersant, Du Pont FOA-2 helps prevent injector-sticking and filter-plugging.

Ask your petroleum supplier about Du Pont FOA-2, or write us direct for more detailed information.

DU PONT
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. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & CO. (INC.) · Petroleum Chemicals Division · Wilmington 98, Delaware

why freight service today is the fastest in history...

ONE REASON IS TWO-WAY RADIO. Now the conductor in the caboose a mile behind is as close to the engineer as the phone at his fingertips. So are other trains, yardmasters, and the dispatcher 200 miles away. On some 13,000 locomotives and cabooses, instant "on the run" radio contact is saving countless hours each day.

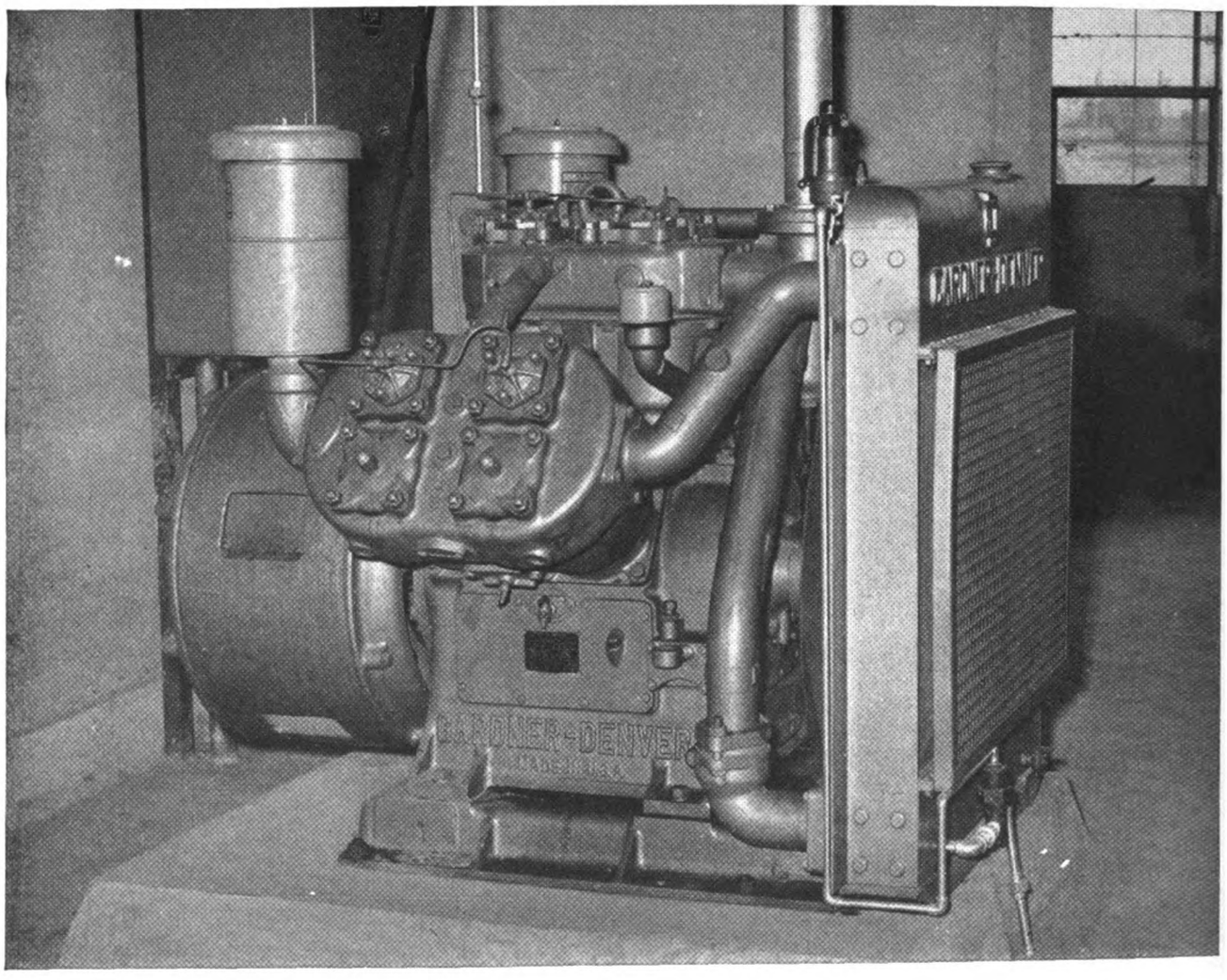
Another GM contribution to railroad prosperity

ONE MORE BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. Hyatts banish hotboxes, one of the major causes of freight train delays. They eliminate time-wasting waits for inspection and lubrication, too, because they have a three-year grease supply sealed in. The new simplified design of HYATT Hy-Rolls makes them so economical to install and maintain that 38 progressive railroads have already adopted them. Roller bearings play a vital part in the multi-million-dollar rail modernization program to make America's freight service *better than ever before!* Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

Watch "WIDE WIDE WORLD" Sundays on NBC-TV

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

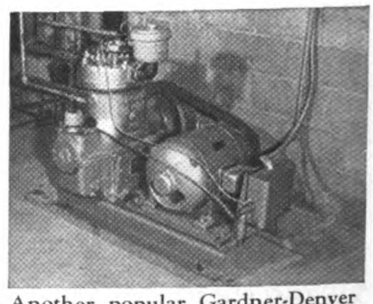
Gardner Denver . . . Serving the World's Basic Industries



Moves in fast . . . starts right away . . .
Gardner-Denver WB Compressor

It's as easy as it looks in this picture to install a Gardner-Denver WB Compressor. Hook up the wiring . . . air line . . . controls—that's about all there is to it. Not much of a foundation is needed—because vibration has been designed out of the machine. The packaged unit has a built-in motor, and a self-contained radiator-intercooler that solves cooling-water problems.

Available in seven sizes from 142 to 686 cfm. Write for Bulletin WB-10, with full specifications.



Another popular Gardner-Denver compressor—noted for long, steady runs—the model AA. Bulletin AA6.

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

FEBRUARY, 1957 VOLUME 131, No. 2

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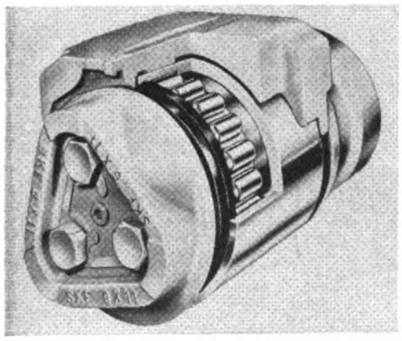
NEXT MONTH:

Interchange Rule Changes
24RL Color Schematic



Freight Car Roller Bearing

A removable type freight car journal bearing, called the General Purpose Freight Car Bearing has been designed to reduced maintenance cost by permitting fast inspection and quick repairs without the need of expensive special equipment.

For inspection, the outer race assembly of the bearing is dismounted by hand while the inner race and enclosure collar, which are fitted to the axle, remain in place. The self-lubricating seal has several holes drilled between the lips of the seal. Besides providing an air vent, this design furnishes a means of disposing of excess lubricant, and uses this grease to lubricate the surface between the seal and the axle cap. A one-piece inner race carries the cylindrical rollers. With this one-piece inner race, only two bearing parts are pressed on the car axle—the inner race and the enclosure collar. The bearing itself consists of four parts, and only three touch the axle. The unit comes completely assembled, pre-greased for three-year service, boxed and mounted on pallets in car sets of eight bearings.

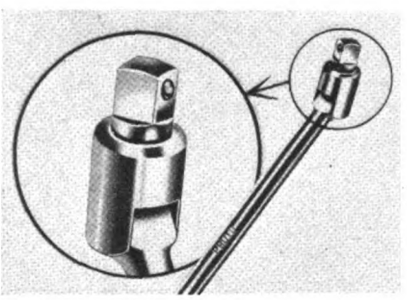
With this packaging, the bearing is mounted directly from the shipping box. After the bearing has been placed on the pilot shaft, the box is slipped off.

This roller bearing is adaptable to all car frame and freight car bearing standards set by the AAR. Now undergoing laboratory and field tests, the bearing is also available in a "free lateral" design. This design provides lateral freedom between the rollers and the outer race shoulder of the bearing. *SKF Industries, Inc., Dept. RLC, Philadelphia.*

Synthetic Paint Remover

The introduction of epon and epoxy based paints which provide tough, high quality finish, has resulted in complex paint removal problems. This remover was compounded to lift this type of paint.

Called LPO (lifts paint off), it is reported to blister the finish off in less than five minutes, without damaging underlying wood or metal surfaces. The remover does not have to be heated to do its work. Two forms of the material are described: One, a standard heavy bodied form which is said to cling to a vertical surface and the other is an unthickened form recommended for tanks. It has no flash point. The manufacturer states that the surface from which paint has been removed by LPO need only be washed with water and dried before repainting. *RPO Chemical Corporation, Dept. RLC, 2727 East Nine Mile Road, Hazel Park, Michigan.*



Free-Wheeling Ratchet Wrench

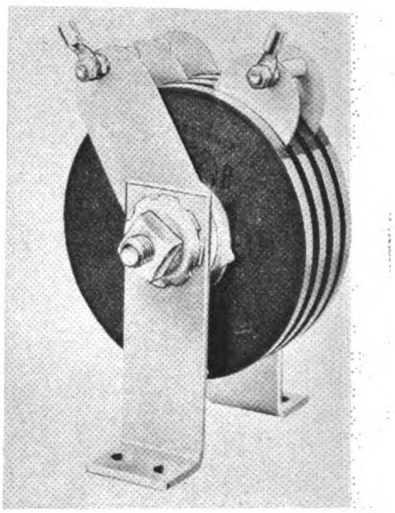
The No. 5457 Rotahead hinge handle tool has a self-contained mechanism that provides a free-wheeling action for socket wrenches. Pressing down on the head allows the handle to rotate in either direction. Release of pressure engages the drive plug for turning of the wrench.

With 30 teeth on the inner wheel, a new position can be secured every 12 deg. Made of alloy steel, it meets military specifications on torque load. Its compact head allows use of the tool in confined spaces on complicated equipment. Overall length is 16 in. *Plomb Tool Company, Dept. RLC, Los Angeles, Cal.*

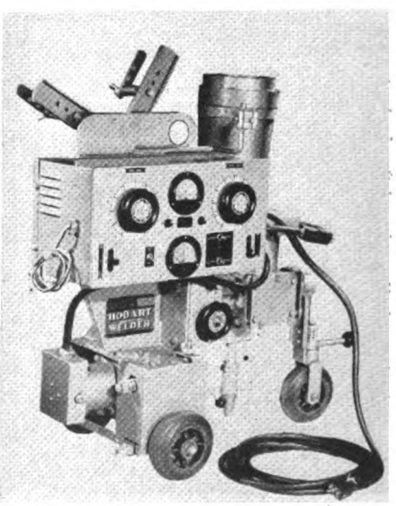
Discharge Resistor

This Thyrite discharge varistor assembly, type 9RV6A, is mounted for direct installation in electrical circuits and represents the first offering of voltage sensitive nonlinear resistors of its type. It is designed to protect motors, generators, lifting magnets, magnetic chucks, solenoids, relays, coils, etc., against high inductive surges resulting from sudden interruption of inductive currents.

The resistors are made in ready-mounted groups of 1 to 4 varistors. Each



disk is 6 in. in diameter and ⅜ in. thick, with a 1 in. central mounting hole. The disks are bracket mounted on a horizontal insulated bolt with a spring lock washer to provide contact pressure. Spacers permit air circulation. Continuous watts loss is only about 2 per cent of an equivalent fixed resistor required to provide the same protection. *General Electric Company, Dept. RLC, Detroit 32.*

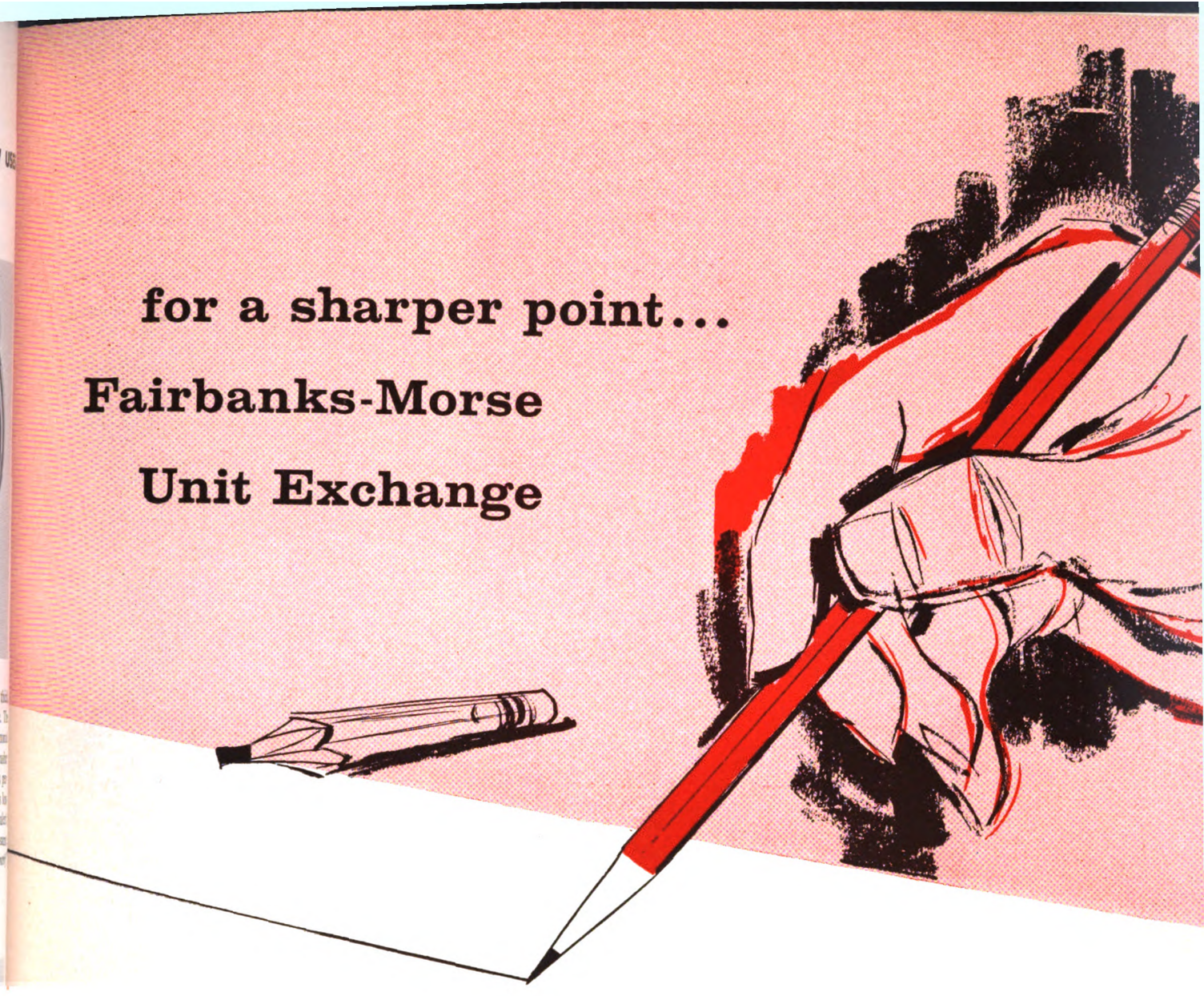


Tractor Type Submerged-Arc Welder

A tractor type automatic submerged arc welding unit for welding operations involving long seams, straight or curved, such as are involved in the welding of tanks is being announced.

It will weld backward or forward,

(Continued on page 8)



for a sharper point...
Fairbanks-Morse
Unit Exchange

F-M Unit Exchange provides a way to meet increased tonnage demands on your motive power fleet—yet reduces your need for repair shop facilities . . . large parts inventory.

In minimum time you can upgrade your F-M power . . . exchange complete engines, blowers, pumps, F-M generators and traction motors. Your exchange equipment meets brand-new specifications and performance. And it carries the same warranty as new equipment.

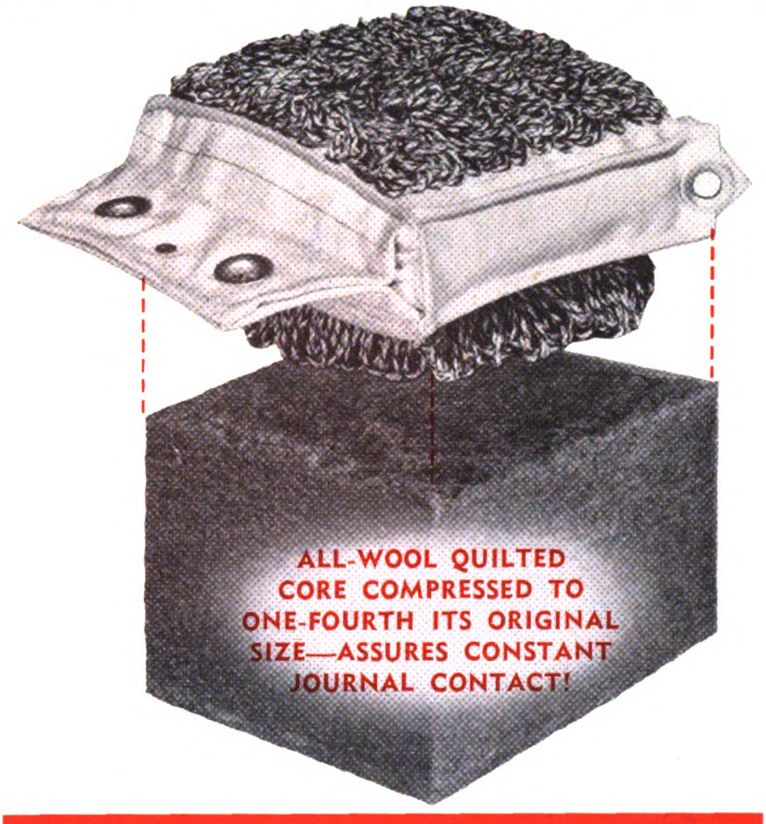
Unit Exchange offers you the quickest way to return a locomotive to more profitable service at reduced maintenance. Fairbanks, Morse & Co., Dept. RLC-2, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS

THE JBS ACME JOURNAL LUBRICATOR
—THE *LOWER COST* LUBRICATOR
THAT FULFILLS ALL REQUIREMENTS:



AAR APPROVED FOR 10,000 CARS
IN GENERAL INTERCHANGE SERVICE

Heavy loop pile surfaces designed for easy application and removal, special unsized duck casing. REINFORCED SIDING TO STAND EXTRAORDINARY WEAR AND TEAR.

100% wool-batt core quilted construction to assure stability available in two sizes: 9-10 for 9″ and 10″ AAR standard journal boxes and 11-12 for 11″ and 12″ standard boxes.

A POSITIVE ADVANCE
IN JOURNAL LUBRICATION

- CANNOT POSSIBLY GLAZE!
- IS UNAFFECTED BY TEMPERATURE CHANGES.
- Contains an UNUSUALLY LARGE OIL RESERVOIR.
- IS RECLAIMABLE!
- HAS EXCEPTIONAL WICKING and FILTERING qualities.

JOURNAL BOX SERVICING CORP.

"30 Years in Car Lubrication"
Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.
General Office: 1112 E. Kessler Blvd., Indianapolis 20, Ind.

EQUIPMENT

(*Continued from page 6*)

either when locked into position for a straight line seam, or when maneuvered by the operator on a curved or irregular seam. An adjustable nozzle permits welding either on a flat butt joint or on a fillet joint.

The basic unit is a fully automatic submerged arc welding unit, with free-wheeling tractor features built-in to insure positive control, maneuverability, and high efficiency. It is made with and without remote control of welding voltage. *Hobart Brothers Co., Troy, Ohio.*

Multiple Outlet Box

A heavy duty multiple outlet box, designed to meet the needs of testing and repair shops, is now being marketed. The unit, Model MO, contains six long life replaceable sockets, a neon indicator light, and an *ON-OFF* switch that controls the entire unit. These are mounted in a rugged, drawn metal case.

The heavy rubber-jacketed supply cord measures 10 ft. The a-c plug contains two fuses thereby protecting equipment. The unit can be mounted as a permanent arrangement, or it can be portable for use where needed. It is finished in brown hammertone with dark brown component parts. It is rated at 15 amp, 110 volts. *CBC Electronics Company, Inc., Dept. RLC, Philadelphia 33.*

Protective Metal Coating

New iron and steel as well as rusted metal may be protected with "Zinktron" zinc-based primer. The coating offers chemical and mechanical protection at the same time by using a super-fine binding material which allows the majority of zinc particles to come in contact with the metal surface being coated. The liquid may be applied with brush or spray and dries tack-free in 40 min. The primer prevents rust-creep and is nonblistering. Any oil based paint may be used over it.

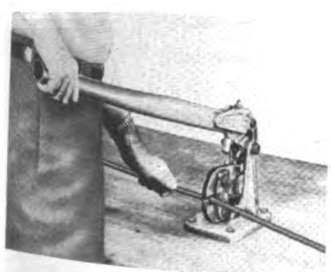
Laboratory results are available for salt spray, adhesion, bending and the Preece test. *Constad Laboratories, 85-02 162nd st., Jamaica, N. Y.*

Electric-Drive Gas Truck

Electric-drive complete with dynamic braking has been applied to a four-wheel industrial truck called the Model GLT Dynamotive. The power plant consists of a Continental gasoline engine, directly coupled to an electric generator. The generator powers a high-torque electric motor which, in turn drives the wheels through a differential. The manufacturer states that the drive has a high efficiency resulting in a fuel saving of over 25 per cent. Maintenance costs are said to be reduced by the elimination of clutches, torque converters and mechanical or fluid transmission.

Engine life is prolonged by the elimination of road shock through the transmission. Power is smoothly applied by increasing engine speed with the foot accelerator. Dynamic braking provides longer brake life and surer control on grades.

The tractor has a drawbar pull of 600 lb normal and 2,000 lb ultimate. Its overall length is 79⅝ in. *Automatic Transportation Co., Dept. RLC, Chicago 20.*



Heavy-Duty Cutter

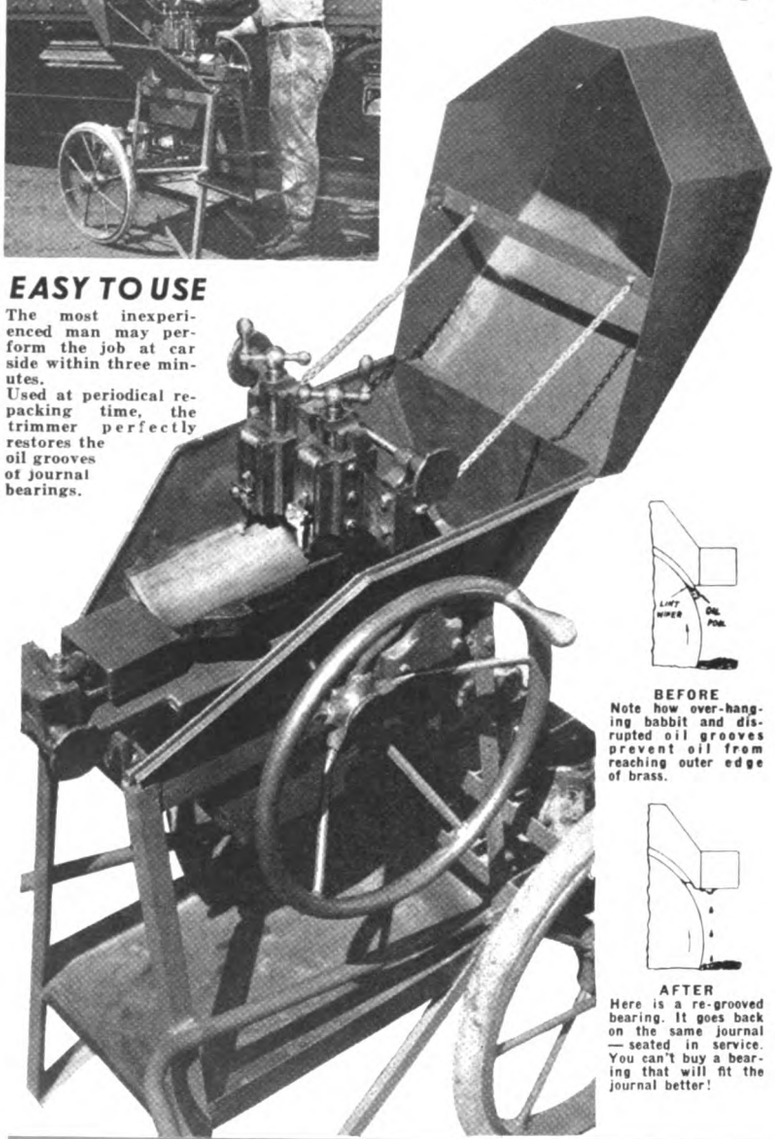
The Heavy-Duty Work-Station Cutter is said to reduce labor in cutting bolts, rods, chain, bars, cable, rods, etc., especially at work stations where operations are repetitive. Two sizes—No. 1 and 3—are offered with a variety of jaws for cutting specific materials. The cutter can be attached wherever a job is to be done. Soft or medium hard metals up to ½

RENT or BUY . . .

THE FAMOUS **JBS** BRASS TRIMMER

SAVES $5.00 ANNUALLY PER CAR!*

*Many years of service records *verify* even greater savings!



EASY TO USE

The most inexperienced man may perform the job at car side within three minutes.
Used at periodical repacking time, the trimmer perfectly restores the oil grooves of journal bearings.

BEFORE
Note how over-hanging babbit and disrupted oil grooves prevent oil from reaching outer edge of brass.

AFTER
Here is a re-grooved bearing. It goes back on the same journal — seated in service. You can't buy a bearing that will fit the journal better!

BEARINGS BETTER THAN NEW!

ELIMINATES CRUCIAL BREAK-IN PERIOD

Trimming and reapplication to the journal from which removed results in the perfectly FITTED BEARING and eliminates the hazard of failure during the otherwise crucial break-in period of a new bearing.

AAR APPROVED

The trimming of bearings has been approved as a CHARGEABLE ITEM on cars in interchange.

JOURNAL BOX SERVICING CORPORATION

"30 Years in Car Lubrication"
Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.
General Office: 1112 E. Kessler Blvd., Indianapolis 20, Ind.

How Oakite Steam Gun Cleaning delivers low-cost end results

Better *results* almost always mean bigger *savings* in cleaning. So use the best in methods as well as materials—it's least expensive in the end.

Cleaning with this Oakite Steam-Detergent Gun, for example, amplifies the penetrating, soil-loosening action of cleaning compound by means of steam heat and jet force.

It blasts out even heaviest, most stubborn soils from hard-to-reach places. It cuts clean-up and rinsing time as much as half. That's a *big* contribution to real economy.

This money-saving equipment has no end of uses. Connected to your steam supply, the gun can clean traction motors, truck, locomotive frames—even strip paint. Want it demonstrated in your shop to your men? Just write OAKITE PRODUCTS, INC., 46 Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

. . . gives you the important advantage
LOW-COST END RESULTS

Export Division Cable Address: Oakite

RAILROAD DIVISION

in. in diameter can be cut by hand power alone. The handle pulls toward the operator, providing a natural action which increases power. The other hand is free to feed the stock. *H. K. Porter, Inc., Dept. RLC, Somerville, Mass.*

Air-Motor Jacks

Two jacks, 20- and 35-ton models, have been added to this company's line of air motor equipment.

These jacks are said to be lightweight, easily portable on semi-pneumatic tires, and capable of lifting gondolas or empty freight cars with ease. A "Toe Lift" increases efficiency when lifting loads too low for the cap on the top of the piston.

The units have spur gearing. Bearings are high-tin bronze or precision type, anti-friction. The models described have pressure lube fittings at the required points. *Joyce-Cridland Co., Dept. RLC, Dayton, Ohio.*

Soldering Iron Tips

These Hexclad soldering tips, coated with a durable layer of iron alloy, are said to outlast plain copper tips more than 10 to 1. Costly maintenance is eliminated because they require no filing or dressing due to pitting or erosion. The tips are available in 40 stock sizes and shapes to fit most makes of soldering irons. *Hexacon Electric Company, Dept. RLC, 547 West Clay avenue, Roselle Park, N. J.*

Portable Sander

This No. 16 SpeedSander was designed to combine high volume production with

(Continued on page 84)

INSIDE STORY ON BETTER SHUNT CONSTRUCTION

Thermoplastic cap protects amalgam from oxidation, prevents shunt fray-offs and pull-outs. ★

Power loss reduced to a minimum by more intimate contact between brush and connection. ➔

Minimum power loss with maximum brush life . . . less down time for maintenance . . . top performance under widely varying road conditions. You can count on all these advantages with "National" brushes because their tamped, plastic-protected shunt connection offers the lowest possible resistance to current flow.

All grades and construction features of "National" brushes are proved in road operation before being offered for regular service. You can always depend on them for superior commutation ability, excellent commutator condition *with* long life.

NATIONAL BRUSHES Best for all types of equipment . . . preferred for all types of service. Order through your equipment manufacturer.

More positive shunt connection of

NATIONAL TRADE MARK **BRUSHES**

gives greater operating economy

The term "National" and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY • **A Division of Union Carbide and Carbon Corporation** • ***30 East 42nd Street, New York 17, N.Y.***

Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

Budd Lightweight Cars For Commuter Service

The 132-passenger multiple-unit commuter coaches for the Pennsylvania, the order for which is reported in this issue, are based on the Budd "Pioneer III" design unveiled last summer, the first of which has since been in test service on the Pennnsylvania between New York and Washington. The order was accompanied by an option on 44 duplicate units, further improvements in which will be made after the six have been tested in service and customer reaction and operating results studied. The 50 cars are expected to cost $9,000,000.

"We hope eventually to replace most of the older cars [471 electric motor cars and 45 trailers] in our suburban service and to operate our commuter service with maximum efficiency," W. W. Patchell, PRR vice-president—research and development, said in announcing the order. "In this way we hope not only to increase commuter patronage, but also to reduce railroad operating costs and cut our losses in this service."

Each of the new stainless-steel cars will be equipped with outboard disc brakes and powered with four newly designed electric traction motors. These motors will accelerate the car, which Budd estimated earlier would weigh 83,000 lb, from a standing start to 30 mph in 25 sec.

The 132 passengers will be seated in reversible seats arranged to accommodate three on one side of the aisle and two on the other. The cars will have pastel-colored, plastic-faced interiors and fluorescent lighting. They will be completely air-conditioned and will have thermostatically controlled electric heating.

Machine Design Award Program

The $25,000 Machine Design Award Program, sponsored by the James F. Lincoln Arc Welding Foundation, closes July 15, 1957. The program offers 26 awards, ranging up to $4,000, for papers giving the best descriptions of the design and fabrication of machines or machine components which are designed for arc welded steel fabrication. Details concerning the program can be had by writing the Secretary, The James F. Lincoln Arc Welding Foundation, Box 3035, Cleveland 17.

Revised Tank Car Specifications

The AAR is concerned over the response so far, to the complete revised 1956 edition of specifications for tank cars. This edition supersedes the previous edition of August 1, 1941, and gives complete coverage of new requirements, particularly those pertaining to all-welded tank cars.

At a recent meeting of the Tank Car Committee, it was the opinion of the committee that it would be to the best interests of the railroads, and the shippers and receivers of all commodities hauled in tank car equipment, if all roads would recognize the necessity for distribution of this publication to all supervisory forces and to each car foreman in limited amounts, depending on the number of yards under his jurisdiction.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JANUARY ISSUE

Diesel-Electric Locomotive Orders

Road and Builder	*No. of units*	*Horsepower*	*Service*	*Other detail*
CANADIAN NATIONAL:				
General Motors Diesel, Ltd.	20	——	Passenger	Deliveries of 222 units, expected early this year, will start plan of completely dieselizing territories, starting from east and west coasts.
	84	1,750	Road switch.	
	18	1,200	Road switch.	
	10	900	Yard switch.	
Montreal Locomotive Works	56	1,800	Road switch.	
	5	1,000	Road switch.	
	29	1,000	Yard switch.	
ILLINOIS CENTRAL:				
Builder unnamed	4	——	Passenger	Cost, $920,000. Delivery expected during first quarter this year.
NORTHERN PACIFIC:				
Electro-Motive	20	1,750	Road switch.	Replaces previous order for five 4-unit freight locomotives reported in June 1956 issue.
VIRGINIAN:				
Fairbanks, Morse	6	2,400	Road switch.	These in addition to a previous order for "Train Masters." Delivery scheduled for second quarter of this year.

Freight-Car Orders

No. of cars *Road and Builder*	*Type*	*Cap., tons*	
CONEMAUGH & BLACK LICK:			
Bethlehem Steel 25	Gondola	25	Approx. cost, $250,000. Delivery scheduled for second quarter this year.
NORTHERN PACIFIC:			
ACF Industries 50	Tank	——	19,000-gal. Delivery expected in June
TENNESSEE CENTRAL:			
Greenville Street Car 10	Covered hopper	70	Delivery expected in May.
TORONTO, HAMILTON & BUFFALO:			
National Steel Car 50	Gondola	70	Deliveries of both lots expected in October.
10	Covered hopper	70	

Passenger-Car Orders

Road and Builder:	*No. of cars*	*Type*	*Other detail*
HUDSON & MANHATTAN-PENNSYLVANIA:			
St. Louis Car	50	——	To be air conditioned. Each car to be 51 ft long, 3 ft longer than cars now in service. 30 to be paid for by PRR—$2,563,788; 20 to be paid for by H&M—$1,675,272.
PENNSYLVANIA:			
Budd	6	Commuter coaches	Cost, $1,500,000. See news item first column this page.

Inquiries and Notes

FREIGHT CARS:

Delaware, Lackawanna & Western.—Will convert, in company shops, 50 cars for use in piggy back service.

Illinois Central.—Plans to construct 2,000 box cars in company shops; cost, $13 million. In addition, will finish 1956 backlog of 500 box cars delayed because of steel strike. Also budgeted—110 flat cars, 50 steel caboose cars, and conversion of 150 freight cars for specialty loading.

Northern Pacific.—Has scheduled 1957 purchase of 150 cars for hauling logs. Plans to rebuild 200 box cars into double-deck stock cars in company shops. Estimated cost, $720,000. Delivery about third quarter of year.

Virginian.—Ordered materials for construction, in company shops, of 500 70-ton hopper cars during last half of 1957.

L&N Sponsors New Educational Program

The Louisville & Nashville has established the following educational program for the purpose of encouraging and assisting supervisory personnel to begin a systematic study of his chosen field.

1. Eligibility — Any supervisory employee* under 40 years of age, in good health, with not less than a high school education, and with three years' employment in the L&N service may apply for enrollment provided he passes the required examination given new applicants for employment, and he has the recommendation of the supervisory officer in the department where he works.

2. L&N will pay tuition in an accredited school or college, or an acceptable extension course of study by mail—

(a) While employee is working if study classes do not conflict with working hours.

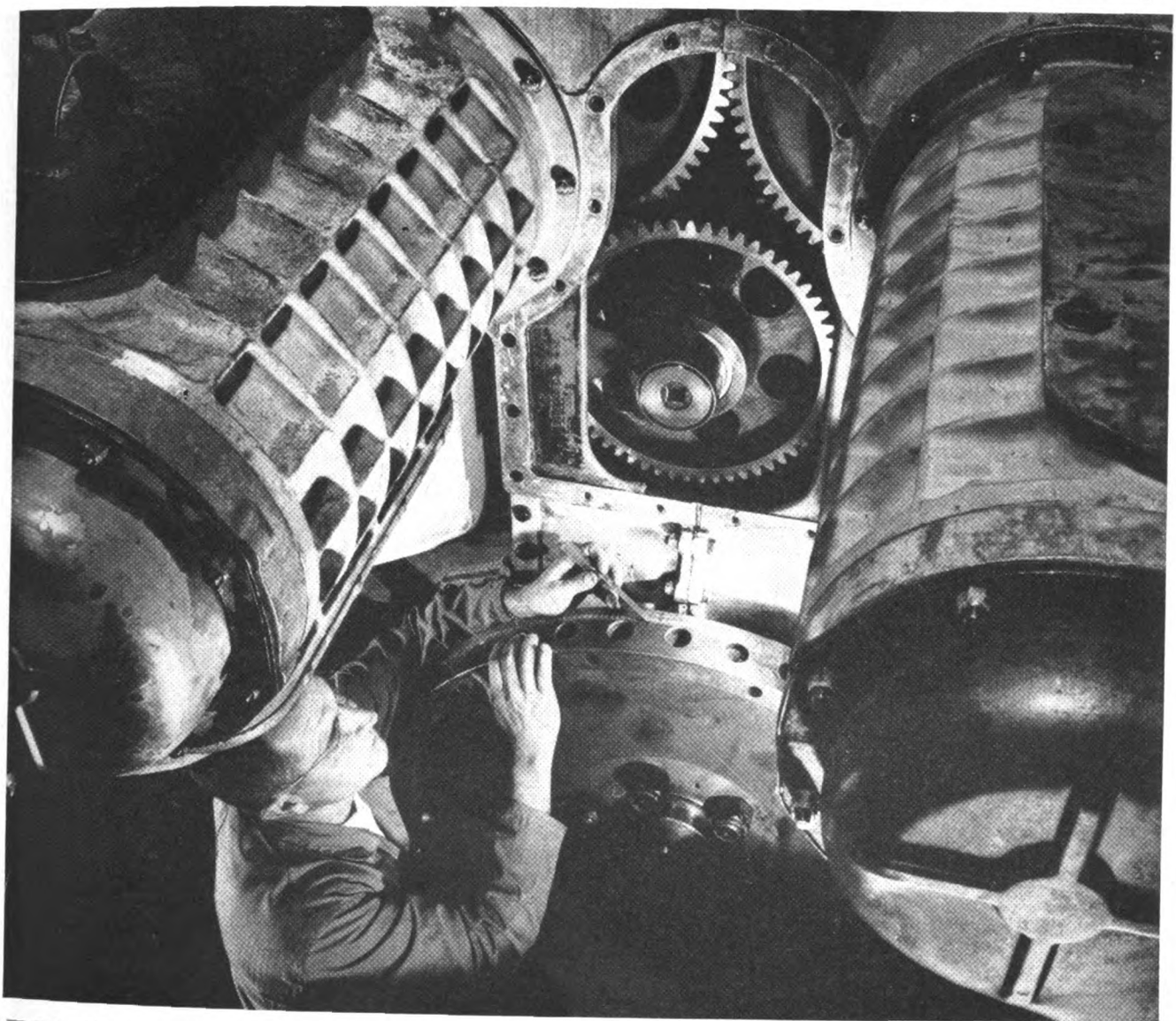
(b) While employee is working part

Note—*A supervisory employee is one of rank of foreman, assistant foreman, chief clerk, assistant chief clerk or higher.

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

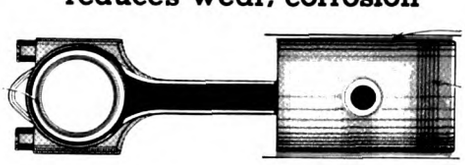
FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

LUBRICATING OILS RPM DELO

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "RPM DELO" AND DESIGN REG. U. S. PAT. OFF

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado

time, provided that working period or time available for work aggregates not less than six months per year. An employee desiring such arrangement must have the detailed plan approved by the supervisory officer in the department where the employee works.

(c) While employee is on leave of absence with the intention of returning to L&N service within one year.

3. Employee may select courses to be studied, but upon his request the personnel officer will advise courses that may be helpful in the improvement of the education of the employee in his chosen field.

4. Employee enrolling for a study course must make satisfactory progress. The L&N reserves the right to withdraw its support upon the recommendation of the superior officer in the department where the employee works.

This new program is the latest phase of a personnel development plan which has been going on for some years, and was placed on a systematic basis some 10 years ago.

Box Cars With Plug and Sliding Doors on One Side

The growing demand for box cars equipped with wide door openings to provide for mechanized loading and unloading of packaged lumber, steel, etc., together with the use of the car at any time for grain or other bulk loading, has been recognized by the AAR's Car Construction Committee.

The committee feels that the interest of the railroads would be well served if each road contemplating new box car construction of this type, would investigate the design of car with the 16-ft. clear opening as being the "most acceptable car" for mechanized loading and unloading.

By concentrating on construction of door arrangement of this size, cars of this type can be built at less cost, the committee said. This would provide equipment necessary for a variety of shippers' needs and would be in line with suggestions and requirements of a large segment of shippers using rail transportation.

The committee has also found it "desirable" to maintain the principle of one plug type and one sliding type door on each side.

BOOKS

HEATING VENTILATING AIR CONDITIONING GUIDE 1956. The technical data section of this 34th edition contains 1,176 pages. The Catalog Data Section presents material concerning the products of 335 manufacturers. Some chapters are new and others have been almost completely rewritten. Particular attention has been given to the presentation of heat transmission coefficients of building materials. More tables make it easier to compute the effect of adding air spaces or insulations to walls, ceilings or floors. Other material which has been rewritten is that concerned with automatic control and a description of current control equipment using the latest nomenclature. The technical data continues to be presented in 53 chapters grouped under seven sections.

American Society of Heating and Air-Conditioning Engineers, 62 Worth street, New York 13. Price, $12.

SIGNIFICANCE OF ASTM TESTS FOR PETROLEUM PRODUCTS. This third edition concisely outlines the significance of the various ASTM methods of test related to petroleum products and calls attention to their limitations. It has been prepared for petroleum executives, engineers, laboratory technicians, etc., and those concerned with the properties of petroleum products and the tests thereof to help them acquire a general idea of the various methods of test and to understand performance characteristics of specific products and the significance of the properties of petroleum products in relation to one another. Few technical terms are used. Each chapter discusses a particular property or characteristic, covering the importance of sampling, selection of test apparatus, methods of test which apply and their significance. For full details of the individual test, reference must be made to the 1956 edition of "ASTM Standards on Petroleum Products and Lubricants" (price, $6.75). The eleven chapters, determined by general properties, are Sampling Petroleum Products, Measurement and Calculation of Volume, Volatility, Combustion, Oxidation Characteristics, Flow Characteristics and So-

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of October		10 months ended with October	
		1956	1955	1956	1955
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	4,144	6,261	39,479	54,816
3—06	Total, Diesel-electric	38,910	37,815	372,279	353,681
3—07	Total, electric	752	813	7,300	7,515
3—04	Total, locomotive-miles	44,097	45,119	421,569	418,212
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1,817	1,868	16,940	16,739
4—06	Empty, total	979	933	9,384	9,119
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	10,495	14,420	98,066	126,769
6—02	Total in oil-burning steam locomotive trains	1,745	3,066	12,814	21,936
6—03	Total in Diesel-electric locomotive trains	114,737	109,740	1,075,090	1,003,853
6—04	Total in electric locomotive trains	2,417	2,456	22,734	22,865
6—06	Total in all trains	130,378	130,412	1,217,584	1,182,662
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.02
10—02	Loaded freight car-miles	44.2	44.5	43.1	43.0
10—03	Empty freight car-miles	23.8	22.2	23.9	23.4
10—04	Total freight car-miles (excluding caboose)	68.0	66.7	67.0	66.4
10—05	Gross ton-miles (excluding locomotive and tender)	3,171	3,106	3,100	3,037
10—06	Net ton-miles	1,477	1,444	1,422	1,380
12	Net ton-miles per load car-mile (M-211)	33.4	32.5	33.0	32.1
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	65.0	66.7	64.4	64.7
14	Averages per train hour (M-211):				
14—01	Train miles	18.2	18.4	18.5	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	57,153	56,440	56,848	56,001
14	Car-miles per freight car day (M-240):				
14—01	Serviceable	48.8	49.3	46.8	46.8
14—02	All	47.0	47.2	45.0	44.3
15	Average net ton-miles per freight car-day (M-240)	1,020	1,022	956	921
17	Per cent of home cars of total freight cars on the line (M-240)	39.6	39.3	41.7	45.7

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—05	Steam	584	1,244	7,409	13,993
3—06	Diesel-electric	20,068	20,082	202,834	202,407
3—07	Electric	1,212	1,229	12,458	13,019
3—04	Total	21,829	22,556	222,702	229,425
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	224,405	230,760	2,305,585	2,347,084
4—09	Total in coal-burning steam locomotive trains	3,736	7,396	45,943	79,843
4—10	Total in oil-burning steam locomotive trains	586	3,423	14,352	41,821
4—11	Total in Diesel-electric locomotive trains	205,462	205,587	2,096,407	2,076,101
12	Total car-miles per train-mile	9.79	9.78	9.81	9.82

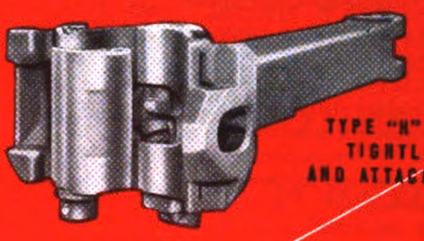
YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	239,042	331,260	2,327,287	2,863,484
1—02	Steam, oil-burning	31,508	54,373	310,010	488,749
1—03	Diesel-electric[1]	4,032,731	3,894,482	38,080,427	36,457,886
1—06	Total	4,307,686	4,285,141	40,753,948	39,874,179
2	Passenger yard switching hours:				
2—01	Steam, coal-burning	5,471	7,571	57,236	83,909
2—02	Steam, oil-burning	3,178	6,067	32,818	52,781
2—03	Diesel-electric[1]	249,896	245,836	2,473,188	2,436,987
2—06	Total	282,662	285,715	2,810,200	2,831,763
3	Hours per yard locomotive-day:				
3—01	Steam	7.4	7.1	6.3	5.8
3—02	Diesel-electric	16.2	16.2	15.7	15.6
3—05	Serviceable	16.2	15.9	15.7	15.3
3—06	All locomotives (serviceable, unserviceable and stored)	15.1	14.5	14.3	13.7
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.65	1.60	1.67	1.65
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.78	.76	.75	.75

[1] Excludes B and trailing A units

Since 1902..
'DEPENDABILITY IN SERVICE'

TYPE "E" RIGID SHANK COUPLER & YOKE



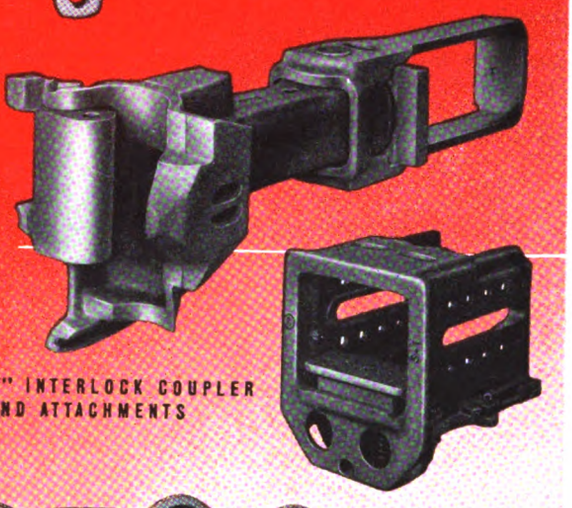
TYPE "H" TIGHTLOCK COUPLER AND ATTACHMENTS

TYPE "E" SWIVEL SHANK COUPLER & YOKE

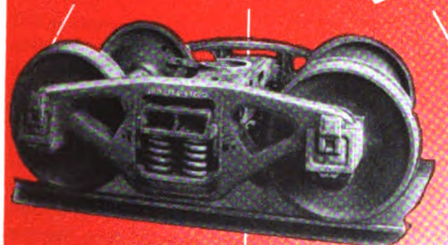
. . a time-proven feature of all

Buckeye

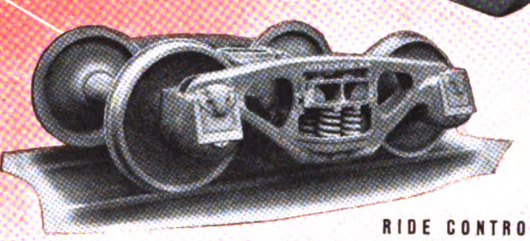
STEEL CASTINGS for RAILWAY EQUIPMENT



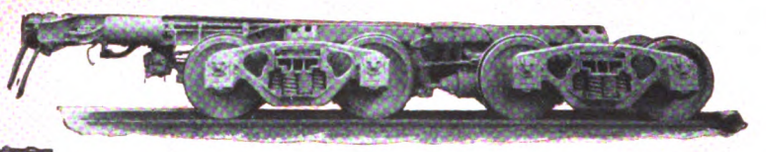
TYPE "F" INTERLOCK COUPLER AND ATTACHMENTS



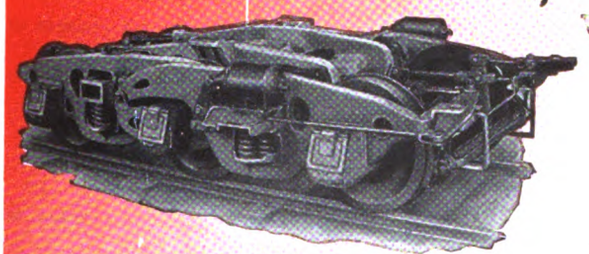
BUCKEYE C-R (CUSHION-RIDE) FREIGHT CAR TRUCK



RIDE CONTROL (A-3) FREIGHT CAR TRUCK



BUCKEYE EIGHT-WHEEL TRUCK



BUCKEYE SIX-WHEEL TRUCK

FOR COMPLETE INFORMATION . . . CALL or WRITE

Refer Adv. No. 11876

The Buckeye Steel Castings Co.

BRAND TO PROGRESS

RPI MEMBER

COLUMBUS, O.
NEW YORK, N.Y.
CHICAGO, ILL.
ST. PAUL, MINN.

lidification, Corrosion, Other Physical Characteristics and Tests, Chemical Analyses and Tests, Analysis for Hydrocarbon Types, and Butadiene Analysis.

American Society for Testing Materials, 1916 Race street, Philadelphia 3. Price, $2.50.

"TENTATIVE REFERENCE PHOTOGRAPHS FOR MAGNETIC PARTICLE INDICATIONS ON FERROUS CASTINGS" (E 125-56T). Discontinuities in iron and steel castings detectable by the dry powder magnetic particle method may now be classified by comparison with these reference photographs published by the ASTM. The photographs, showing indications observed on actual castings, have been reproduced through the courtesy of the Steel Founders' Society of America from photographs obtained from its member companies. They cover linear discontinuities (hot tears and cracks), shrinkage, inclusions, internal chills and unfused chaplets, porosity, weld discontinuities, false indications, and magnetic anomalies.

American Society for Testing Materials, 1916 Race street, Philadelphia 3. Price, $2.50.

AXLE RESEARCH. MECHANICAL RESEARCH REPORT MR-242, "Fatigue Tests of Freight Car Axles"—Second Progress Report, dated June 1955—concludes the fatigue tests of the raised wheel seat, unmachined body freight-car axle which is now an alternate standard for freight cars. *Price: To members, $1.75; to others, $3.50.*

MECHANICAL RESEARCH REPORT MR-243, "Effect of Overheating on the Fatigue Resistance of Plain Bearing Axle Journals"—Second Progress Report, dated July 1956—contains additional data accumulated in the investigation of overheated journals, supplementing MR-212, First Progress Report. The investigation to date has included fatigue testing of axles overheated under controlled laboratory procedures and axles removed from railroad service because of overheating. *Price: To members, $2.25; to others, $4.50.*

Fred Peronto, secretary, Mechanical Division, Association of American Railroads, 59 East Van Buren st., Chicago 5.

ASTM MANUAL FOR RATING MOTOR FUELS BY MOTOR AND RESEARCH METHODS. This manual was prepared by ASTM Committee on Petroleum Products and Lubricants to revise and bring up to date the ASTM methods for determining the knock characteristics of motor fuels by the Research and Motor Methods and better to serve users of ASTM knock test engines by providing six appendices, presenting by word and picture, factual information and data on the operation and maintenance of the knock-testing equipment. Methods are: Standard Method of Test for Knock Characteristics of Motor Fuels, by the Motor Method (D 357), and Standard Method of Test for Knock Characteristics of Motor Fuels by the Research Method (D 908), commonly referred to as the Motor and Research methods. Also included are six appendices on apparatus, reference materials and blending accessories, operation, maintenance, installation and assembly, building and utility requirements, which contain valuable and necessary information for conducting standardized octane ratings on motor fuels.

American Society for Testing Materials, 1916 Race street, Philadelphia 3. Price, $6.75.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
October, 1952	3,093,990	4,058	8,053	12,111	255,469
October, 1953	3,042,559	3,863	6,493	10,356	293,796
October, 1954	2,852,826	5,182	6,985	12,167	234,472
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505

Personal Mention . . . . . .

Canadian Pacific

ROY W. WILSON, division master mechanic at Moose Jaw, Sask., retired.

H. E. ALLAN, general locomotive foreman at Alyth, Alta., appointed division master mechanic at Moose Jaw, Sask.

R. A. BAKER, locomotive foreman at South Edmonton, Alta., appointed general locomotive foreman at Alyth, Alta.

H. I. SINCLAIR, shop foreman at Alyth, Alta., appointed locomotive foreman at South Edmonton, Alta.

Elgin, Joliet & Eastern

ROBERT H. CHEVILLE, car foreman at Joliet, Ill., retired.

ROBERT A. ROBOWSKI, car foreman at Kirk Yard, Gary, Ind., appointed car foreman at Joliet, Ill.

LOUIS J. VERBICH appointed car foreman at Kirk Yard, Gary, Ind.

Missouri Pacific

WILLIAM R. SUGG, mechanical superintendent, Western District, Kansas City, Mo., retired.

W. F. DUNCAN, acting mechanical superintendent, Gulf District, Palestine, Tex., appointed mechanical superintendent, Western District, Kansas City, Mo.

H. B. BANEY, returning from leave of absence, resumes as mechanical superintendent, Gulf District, Palestine, Tex.

New York Central

New York

K. S. WEAVER appointed assistant supervisor personnel—mechanical.

L. R. RAETHER appointed assistant supervisor locomotive maintenance.

Norfolk & Western

Portsmouth, Ohio

C. A. REINHARD, general foreman, retired.

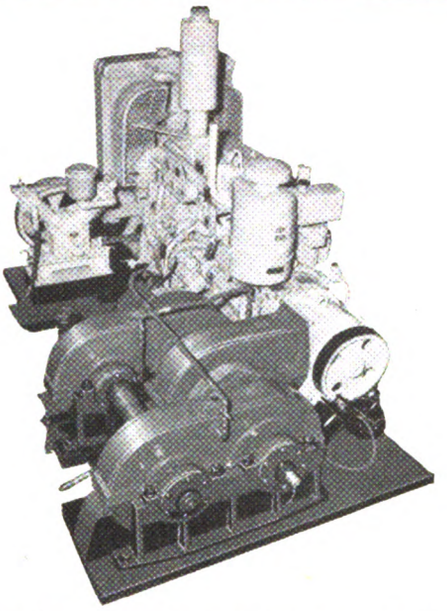
WALTER E. PIERCE, back shop foreman, appointed general foreman.

Lamberts Point, Va.

RICHARD A. ROBINNET, day roundhouse foreman, retired.

(Continued on page 20)

HOW SUBSTANTIAL SAVINGS IN LOCOMOTIVE CRANE FUEL COSTS ARE BEING MADE WITH THESE STEAM-TO-DIESEL CONVERSION UNITS



The economy of diesel engine operation is such that, with savings on both lower fuel and lower maintenance costs, the initial expenditure on a Brownhoist Diesel Conversion Unit is soon amortized. Brownhoist Conversion Units are engineered to the individual requirements of your crane. The component parts consist of the diesel engine, the torque converter, the roller bearing mounted friction clutches, and the air compressor . . . all mounted on a heavy one-piece slab base ready for installation. These units are completely assembled and tested before shipment to you, and the conversion bill-of-material becomes a permanent part of your crane record, to expedite future service. Write today or contact your Industrial Brownhoist representative (give crane serial number).

THIS 1925 150 TON WRECKER WAS STEAM, IS NOW DIESEL RESULT:

LOWER OPERATING COSTS

This Brownhoist 150 Ton Steam Wrecking Crane, built in 1925, was recently adapted to diesel with one of our conversion units. Its operators report a substantial savings in maintenance and fuel bills, more than justifying the cost of conversion.

BROWNHOIST

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

SUBSIDIARY OF Penn-Texas CORPORATION

INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: Philadelphia, Washington, Cleveland, Chicago, San Francisco, Montreal
AGENCIES: Detroit, Birmingham, Houston

1
2
3
4
5

Why Electro-Motive is expanding facilities 42% at La Grange

According to the best projected census and economic growth figures available, if the railroad industry only maintains its *present* share of the total passenger and freight business in this country, there will be forty per cent more passengers and ton-miles to be hauled by American railroads in 1966. And there are many signs that the railroads' share of the total market could rise well above this figure.

By expanding facilities now, Electro-Motive will be in a position to serve you better, to help you anticipate your increasing motive-power requirements, keep pace with the demands of an expanding economy.

Thus, whether it's new and ever better standard locomotive units, re-manufacture and upgrading of older units, research and development of entirely new engines and other railroad products, Electro-Motive is in a better position than ever to support your position in the transportation field. It's our way of saying, "We have great faith in your future".

1 BASIC MANUFACTURING AREA

Over 17,000 Diesel-electric units have been produced in the plants of Electro-Motive. Today, they are operating 20 million switcher yard-hours, hauling almost 2 billion passenger train-car miles and nearly 900 billion ton-miles every year.

2 LOCOMOTIVE RE-MANUFACTURE

Pioneered by Electro-Motive, this new service is saving the railroads millions of dollars in reduced operating costs by upgrading horsepower ratings and general complete modernization.

3 PARTS CENTER

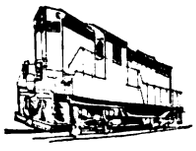
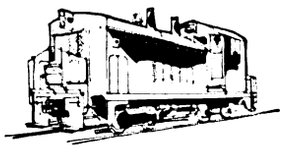
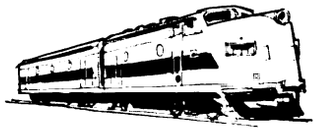
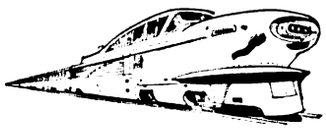
This complete warehouse stock services the other six warehouses and serves as a Midwest warehouse also. These complete facilities have been designed and enlarged to help you keep your motive power operating at top efficiency all the time.

4 RESEARCH AND DEVELOPMENT CENTER

From the time the first Diesel became a reality, this facility has worked tirelessly to bring the General Motors Diesel-electric to the brilliantly engineered piece of equipment it is today. More improvements, more new products are on the way.

5 NEW MANUFACTURING FACILITIES

This represents the new investment in our future, so closely allied to yours. In this way, we insure the extension of our program of continuing high quality and improvement, new design, better services to the nation's railroads.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Ltd., London, Ontario

PERSONAL MENTION

N&W (Continued from page 16)
Lamberts Point, Va.

DAVID BLANFORD, night roundhouse foreman, appointed day roundhouse foreman.

H. C. BRADLEY, assistant roundhouse foreman, appointed night roundhouse foreman.

Virginian

L. C. KIRKHUFF, superintendent motive power, Princeton, W. Va., retired.

W. W. OSBORNE, assistant superintendent motive power, appointed superintendent motive power, Princeton, W. Va.

W. A. GRIGG, master mechanic, Victoria, Va., appointed assistant superintendent, Princeton, W. Va.

R. R. MCDANIEL, general foreman, Mullens, W. Va., appointed master mechanic, Norfolk division, Victoria, Va.

W. A. Powers

Supply Trade Notes

FAIRBANKS, MORSE & CO.—*P. R. Flood* has been appointed general manager of the Beloit, Wis., works, succeeding *W. E. Watson,* resigned. Mr. Flood was previously manager of the Pomona Works.

■

C & D BATTERIES, INC.—*Eugene L. Krauss* has joined *Mark C. Pope Associates,* Atlanta, Ga., sales representative for C & D.

■

FRANKLIN BALMAR CORPORATION.—*Frederick S. Ball* has been elected president, succeeding *George W. Alcock,* who has retired. Mr. Ball was formerly associated with the engineering departments of the General Steel Castings Corporation and SKF Industries.

■

BULLARD COMPANY. — Bullard has acquired the complete line of Hydra-Feed automatic lathes from the *Hydra-Feed Machine Tool Corporation* of South Norwalk, Conn., and Detroit. The manufacture, sales, and service of the Bullard Hydra-Feed lathes, as they will be known, will be handled in the Bullard plant at Bridgeport, Conn., in addition to the regular line of Bullard machine tools.

AIR-MAZE CORPORATION.—*William A. Powers* has been appointed railroad representative, with headquarters at 6459 North Sheridan Road, Chicago.

■

RUST-OLEUM CORPORATION.—*Alfred P. Emery* has been appointed railroad sales manager of *John N. Thorp Company,* Brooklyn, and will supervise sale of Rust-Oleum protective coatings and Molub-Alloy to the railroad industry.

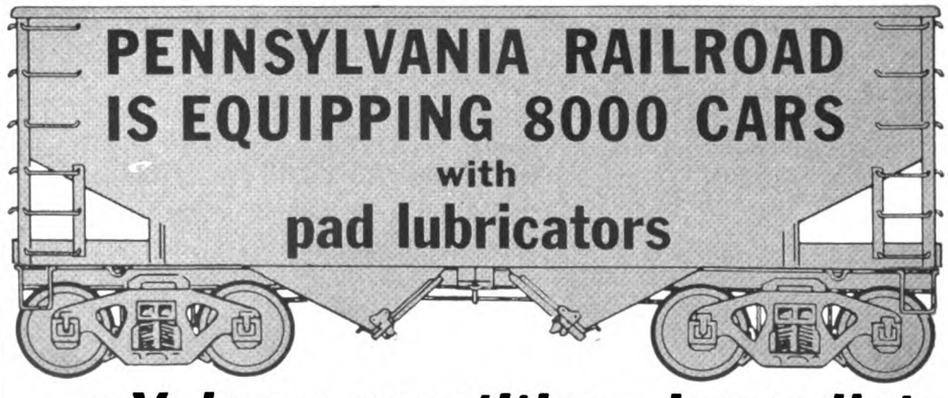
■

AMERICAN BRAKE SHOE COMPANY.—A new Railroad Products Division unites all divisions of American Brake Shoe serving the railroad industry. Included are the railroad product facilities of the Brake Shoe & Castings Divi-

(*Continued on page 74*)

For Progressive Railroading

PENNSYLVANIA RAILROAD IS EQUIPPING 8000 CARS with pad lubricators



MILLER

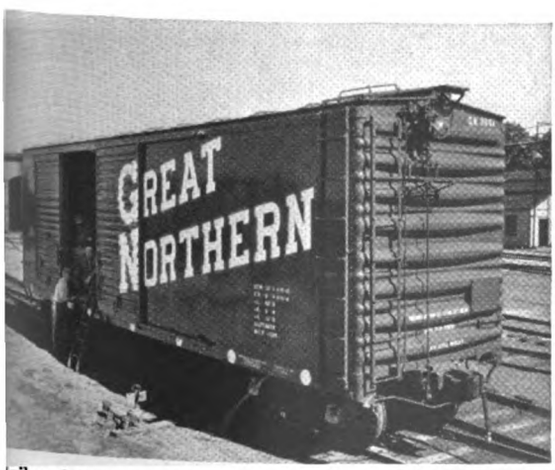
CENTER FEED LUBRICATOR

• Volume quantities—immediate delivery
• Cost—$40 per carset (for all sizes)
• Life expectancy—6 years

MILLER LUBRICATOR CO., WINONA, MINN.

Laying and welding N-S-F in one of 800 new boxcars at Great Northern's St. Cloud, Minn. shops.

N-S-F* helps THE GREAT NORTHERN RAILWAY BUILD FOR THE FUTURE



ailroad inspector giving N-S-F a final check as new reat Northern boxcar rolls off the road's final assembly line at St. Cloud.

Cars equipped with NAILABLE STEEL FLOORING enable progressive railroads to furnish shippers with Class A cars for all kinds of ladings—and safer cars, too, for shippers' personnel. Moreover, N-S-F is a flooring that can make for substantial savings over the years in both original investment and maintenance costs. It is equally economical in either new or used cars.

Pertinent, timely performance and cost studies are available from N-S-F representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal.

N-S-F (TM): NAILABLE STEEL FLOORING
Made and sold by—

tran-steel

STRAN-STEEL CORPORATION
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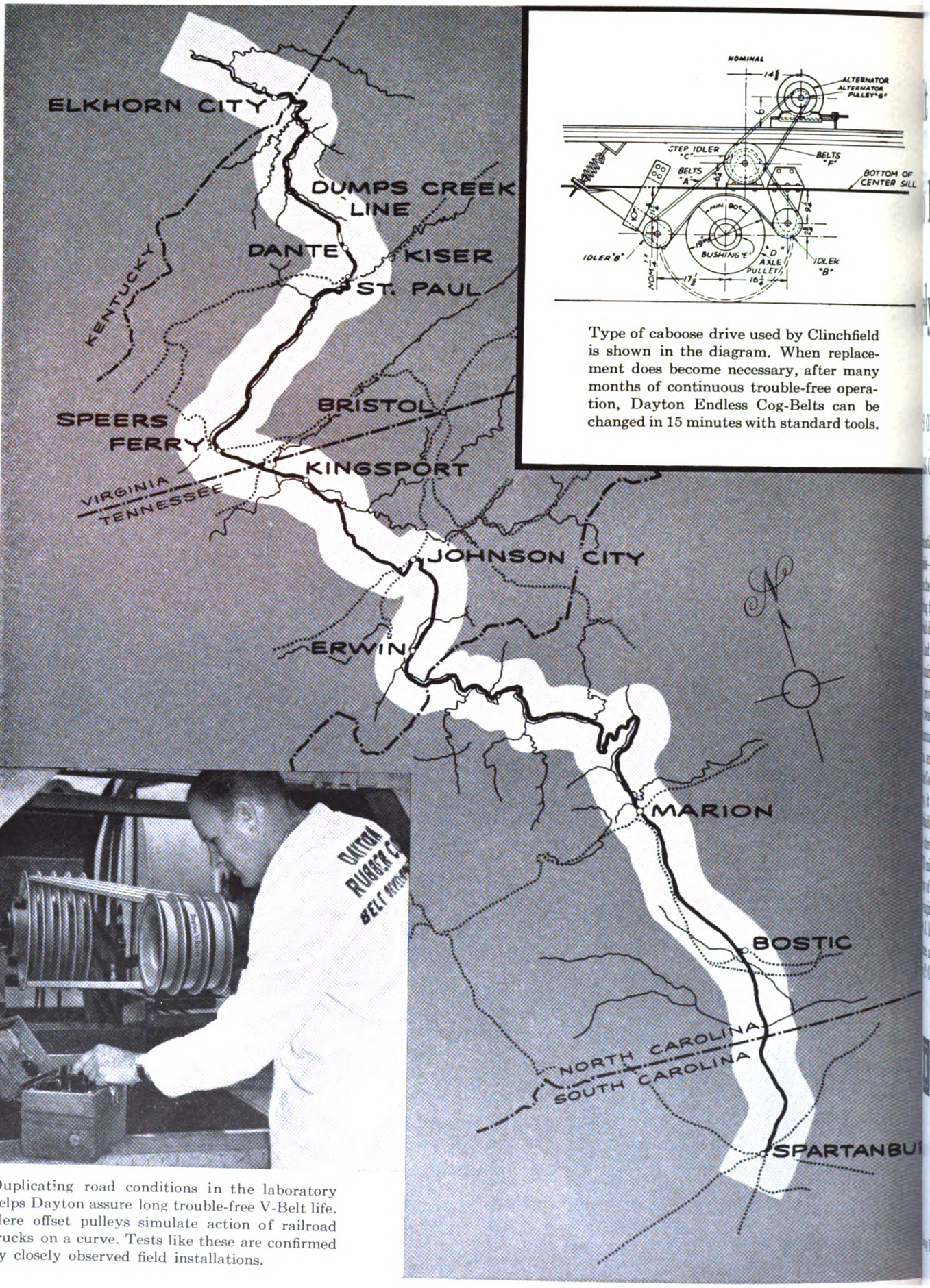

Type of caboose drive used by Clinchfield is shown in the diagram. When replacement does become necessary, after many months of continuous trouble-free operation, Dayton Endless Cog-Belts can be changed in 15 minutes with standard tools.

Duplicating road conditions in the laboratory helps Dayton assure long trouble-free V-Belt life. Here offset pulleys simulate action of railroad trucks on a curve. Tests like these are confirmed by closely observed field installations.

V-Belt drives give full Radio Power on America's most sharply curved Mainline Road

110 miles of curved mainline track; yet Dayton caboose drives deliver long, trouble-free low-cost service.

Radio communication—between Engineer, caboose and wayside—was part of the modernization program on the Clinchfield Railroad. Some method of driving the caboose generators was needed that would deliver full, continuous power at all times. It had to combine low initial cost with minimum maintenance.

An excellent proving ground for equipment, the Clinchfield twists tortuously for 276 miles through the mountains of North Carolina, Tennessee, Virginia, and Kentucky. (Connecting with the Atlantic Coast Line and the Chesapeake & Ohio Railway, it helps provide 3rd morning delivery of perishables from Florida to Detroit.) Longest single stretch of straight track is two miles. Of the 276 miles, 110 have some degree of curvature—many of them 10 to 14 degrees.

Clinchfield's engineering staff, headed up by Chief Engineer J. M. Salmon, Jr., Signal Engineer W. E. Prince, and assisted by Superintendent, Machinery P. O. Likens, studied both direct drives and several types of V-Belt drives. They knew their railroad and the demands it made on equipment. They chose the Dayton V-Belt Caboose drive for its relatively simple design.

With the help of Dayton Field Engineers the first installation was made in November, 1955. Experience showed a need for only minor adjustments. Every mainline train is now equipped with two-way radio. Forty drives were installed.

Service, according to the men of Clinchfield, is even better than expected. The drives have given the dependable, economical source of power needed. And despite operation on sharply curved tracks, they have provided continuous trouble-free service.

Dayton V-Belts can give you the same month-after-month low maintenance service. Help in the solution of your drive problems will be gladly provided by the Dayton Railway Field Engineer. Write The Dayton Rubber Company, Railway Division, Dayton 1, Ohio.

Dayton Rubber

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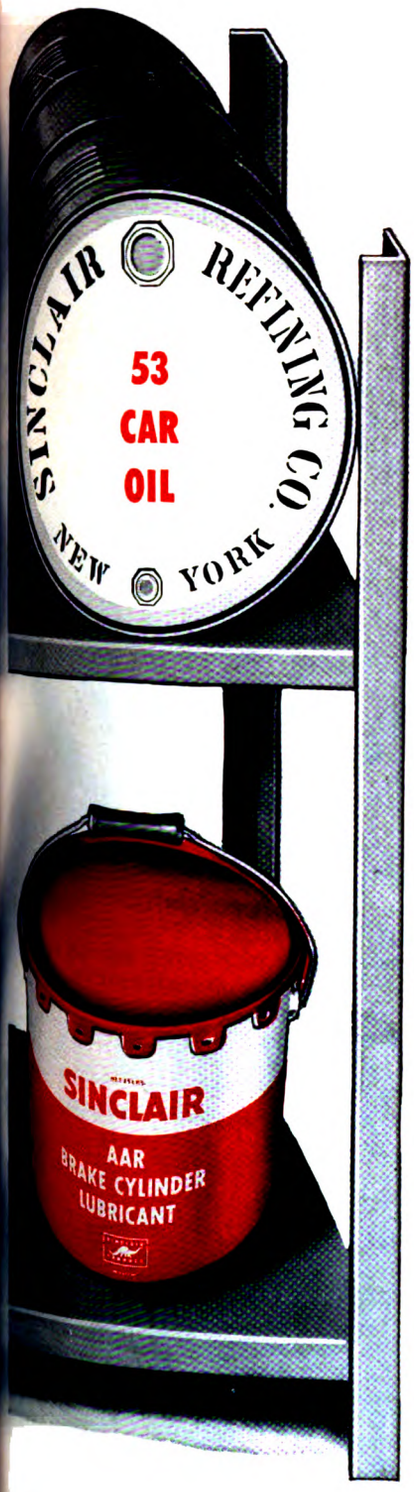

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AiResearch turbochargers now available have been designed on this principle — which promises to be universal in the future. In addition, our units increase power up to 100% depending on design and application of your engine, cut fuel costs, reduce noise and decrease or eliminate smoking. The removable rotating assembly makes them easier to maintain than other turbochargers.

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BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter — in. nom.	9	11.5	15.25	15.25	16
Length — in.	9	14.12	16.75	17.25	21.75
Weight — lb.	40	95	125	135	195
Output — lb/min. (Standard Conditions)	25-40	35-65	35-65	70-95	115-175

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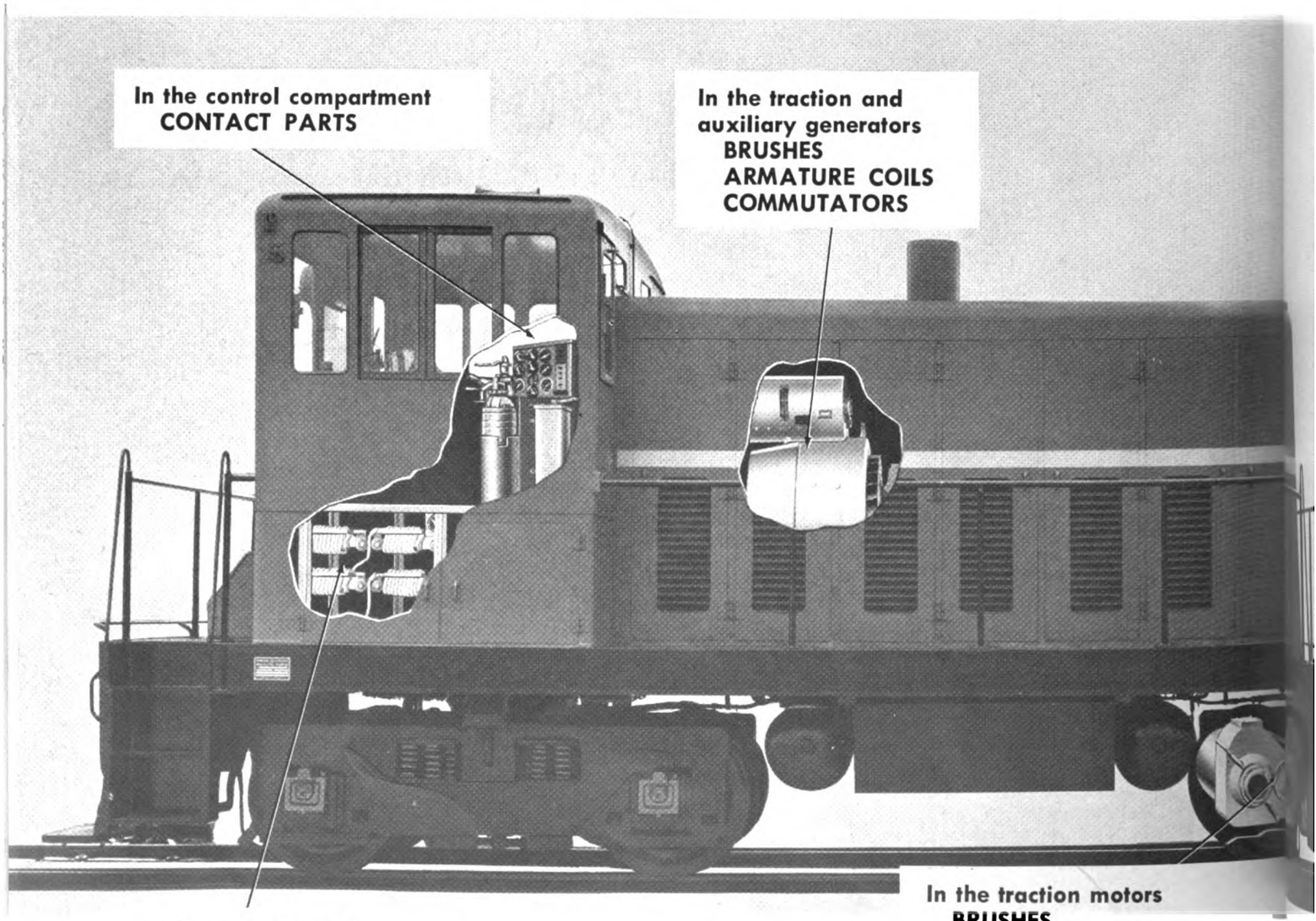
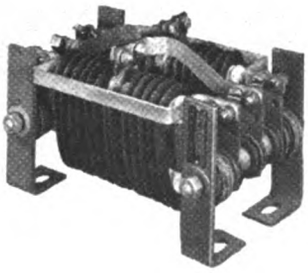


4 CONTACT PARTS break circuits quickly with minimum metal transfer, giving long service life from these parts.

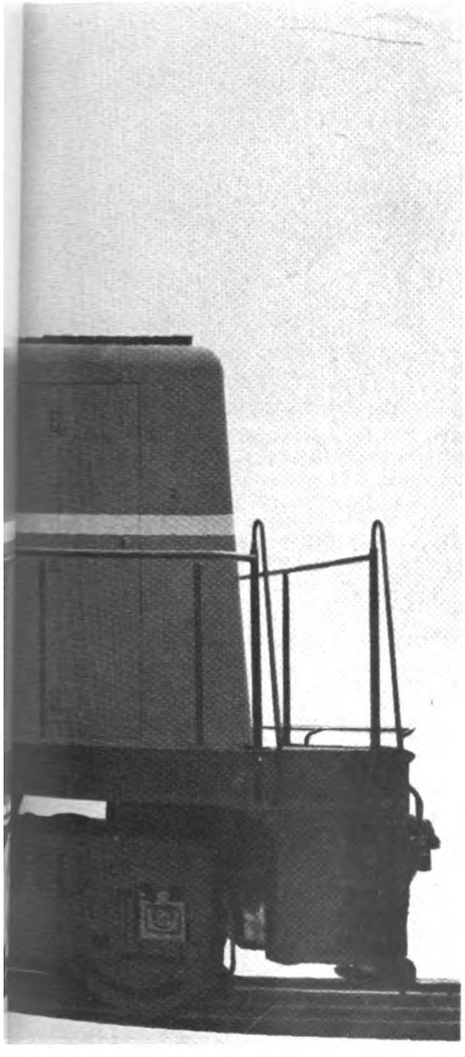
5 RECOMMENDED CARBON BRUSHES, selected for proper degree of hardness and grain structure, minimize wear and tear on commutator surfaces.



6 RESISTORS have floating steel backbones that expand, contract freely with high temperature changes, therefore are not subject to harmful bucking forces.

7 COMMUTATORS, seasoned by high speed, high temperature process, wear longer and retain smoothness.

You Originally Bought 7 Key Replacement Parts



Seven key parts are vital to the steady, dependable performance of your locomotive electrical equipment. That's why when you replace these key electric parts in your General Electric equipped locomotives, you'll want only G-E parts to help you keep all the power that you originally bought.

General Electric's 7 key replacement parts are precision-built to original parts specifications. Each one is manufactured to include the most recent design and engineering advancements. When you use these parts, you'll be helping the electrical components in your locomotives to meet the most modern and efficient standards of operation.

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For all of your G-E equipped locomotive parts needs, contact your nearest General Electric Parts Center or your locomotive builder. For additional information on why G-E parts and parts services are best for you, write for our new brochure, Section 128-40, General Electric Locomotive and Car Equipment Department, Erie, Pa.

Progress Is Our Most Important Product

GENERAL ELECTRIC

The world of science behind
EXIDE-IRONCLAD BATTERIES

Being interviewed is W. W. Smith, Divisional Manager, Product Engineering. Grids in back are of Exide's exclusive Silvium. Those in front are ordinary alloys.

"All of these alloys had the same acid test"

At the Exide Laboratories—**Reporter:** Was it a typical charge-discharge test normally used to test battery components?

Smith: Right. And the two positive plate grids with no visible signs of corrosion are Exide's patented Silvium alloy.

Reporter: How about the others—what alloys are they?

Smith: They're standard alloys used in other well-known makes of batteries. But they don't have Silvium's corrosion-resisting ingredients.

Reporter: Where is Silvium used?

Smith: In the positive plates of all Exide-Ironclad and many other Exide Batteries.

Reporter: How does it affect battery performance?

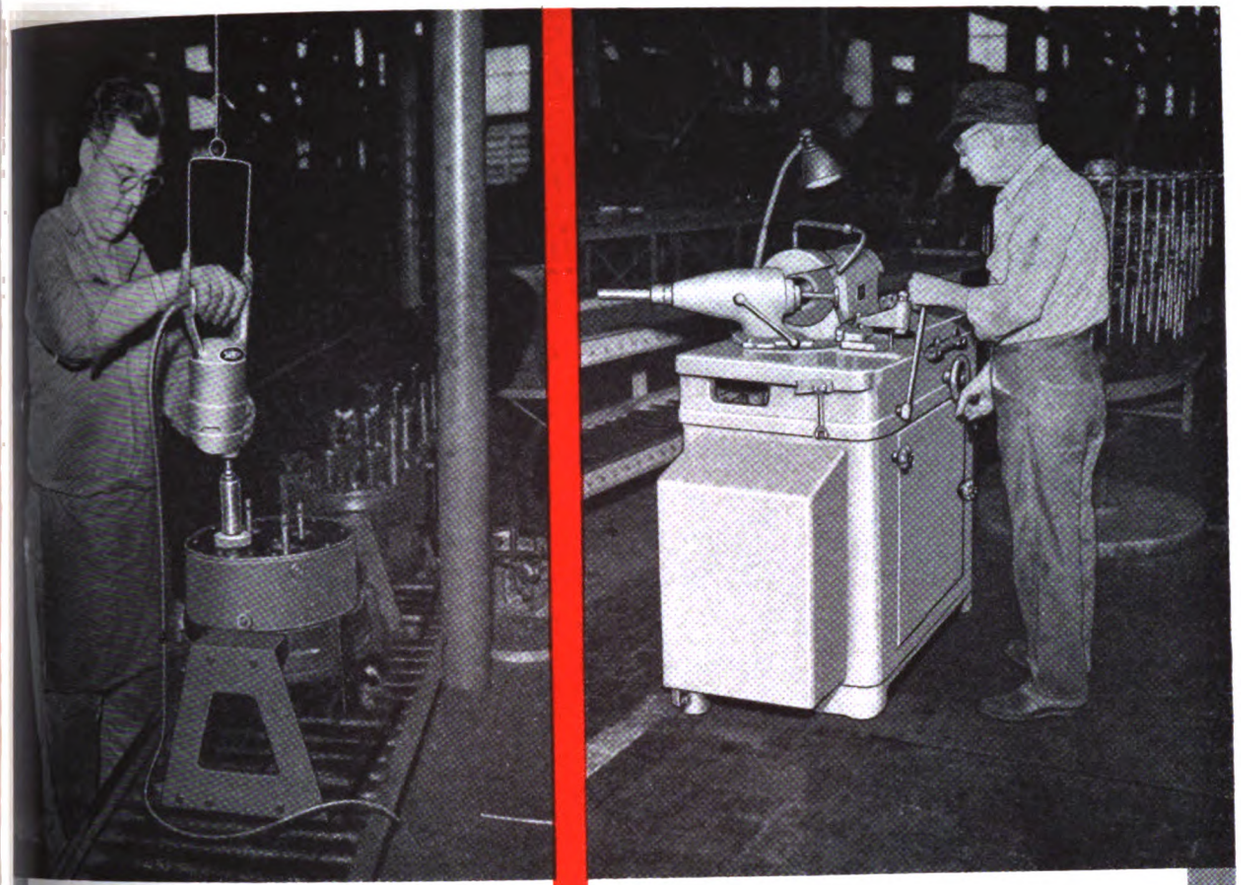
Smith: Every test we've made proves it stretches battery life because the grid resists corrosion—sometimes up to 100% longer.

Reporter: Obviously this is an important feature of the Exide-Ironclad.

Smith: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY **Exide®**



CONVEYOR AND SIOUX SPEED VALVE GRINDING!

Pictured above, left, is a scene in the Chesapeake & Ohio Railroad, Huntington, West Virginia, Diesel Locomotive Shop. The operator is using a SIOUX Heavy Duty Portable Driver, and a SIOUX Stone Grinding E.M.D. Liner Head Valve Seats. The SIOUX Driver is lowered from a retractor hanger. Liner Heads are held in shop-made positioners which are moved along the assembly line conveyor.

Diesel Engine manufacturers recommend SIOUX Valve Seat Grinding Equipment. Factory approved sets include Allis-Chalmers, American-Locomotive, Baldwin Locomotive, Case Tractor, Cooper Bessemer, General Motors Corp., Hercules Engines, International Harvester Trucks and Tractors, John Deere Tractor, Massey-Harris Tractor, Minneapolis-Moline Tractor, National Supply, Oliver Tractors, Onan Engines, Reo Motors, White Motor Trucks.

The new Spline Drive now being supplied, gives from ten to twenty times the life of the hex drive, and is more accurate.

A SIOUX 682L Valve Face Grinding Machine is shown above, right, in operation in the Chesapeake & Ohio Railroad, Huntington, West Virginia, Diesel Shop.

More SIOUX *Valve Grinding Machines are in use than all other kinds combined.* No other machine compares with the SIOUX 682L in ruggedness, precision, and ability to do the big jobs.

Your nearest SIOUX Distributor is listed in the yellow pages under "Portable Electric Tools".

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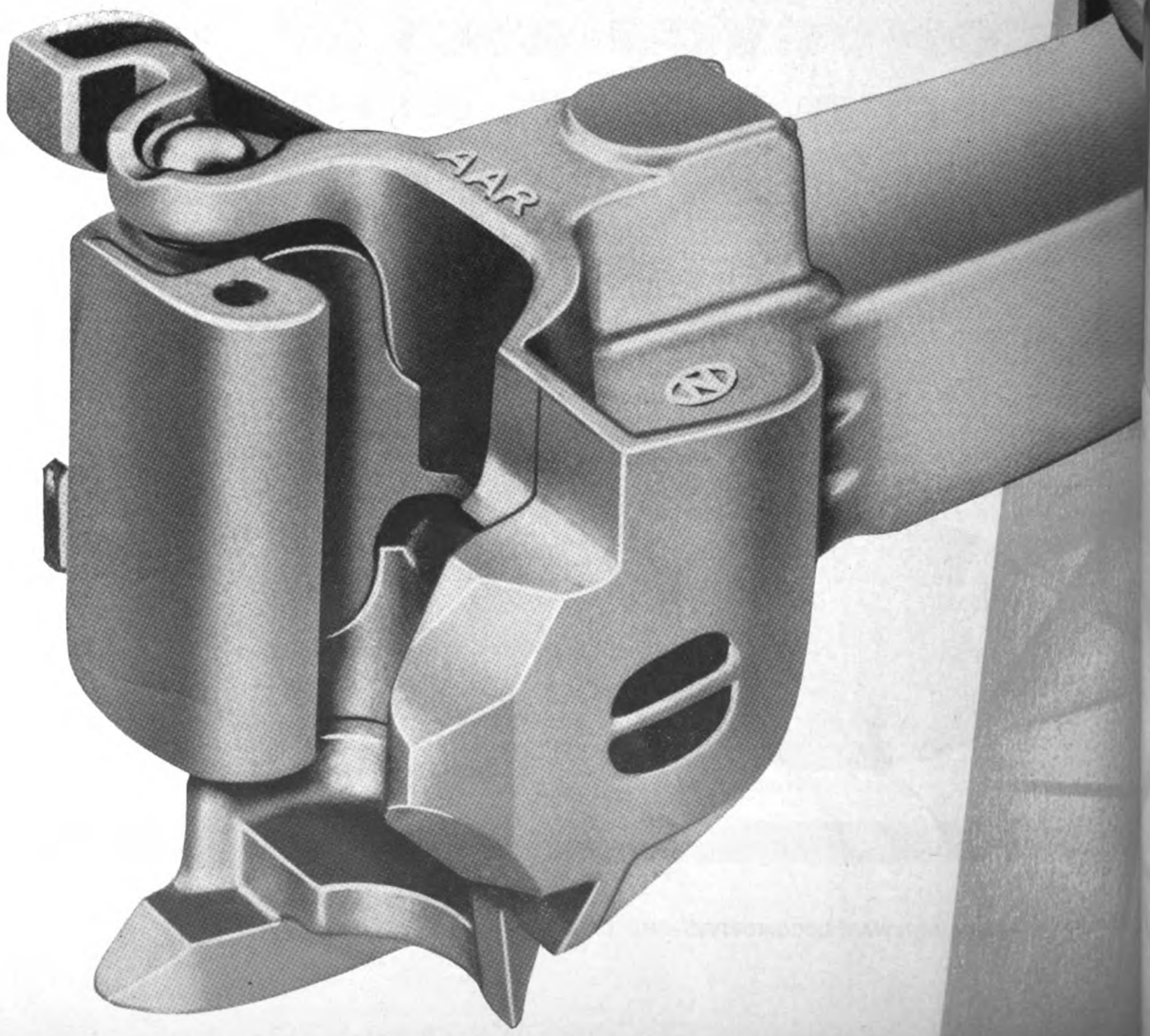
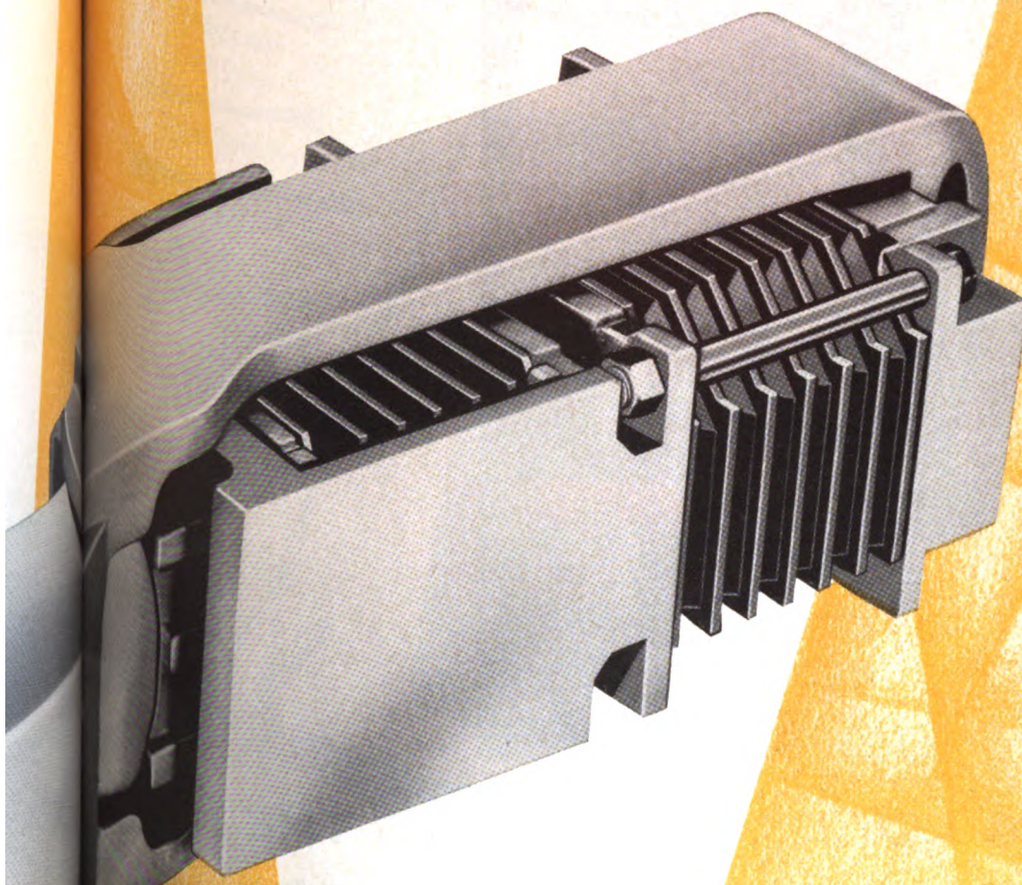
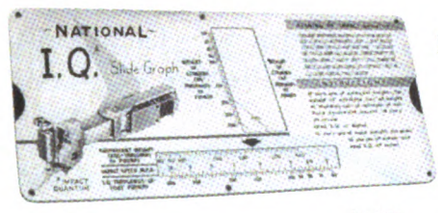
REASON:

National's MF-400 Rubber-Cushioned Draft Gears have a rated capacity of 42,500 foot pounds, *plus* a reserve capacity 54 per cent greater than the rated — *65,500 foot-pounds!* This reserve capacity guarantees the original rated capacity at the original force level over a longer period of time than possible with gears that have definite solid points at their rated travel.







AA-3536

NATIONAL'S IQ SLIDE GRAPH

(Available upon request)

Shows total work done in foot-pounds during impacts between various cars at various speeds! Shows how much of this work National Draft Gears account for at various force levels! Points up need for high capacity in draft gears!

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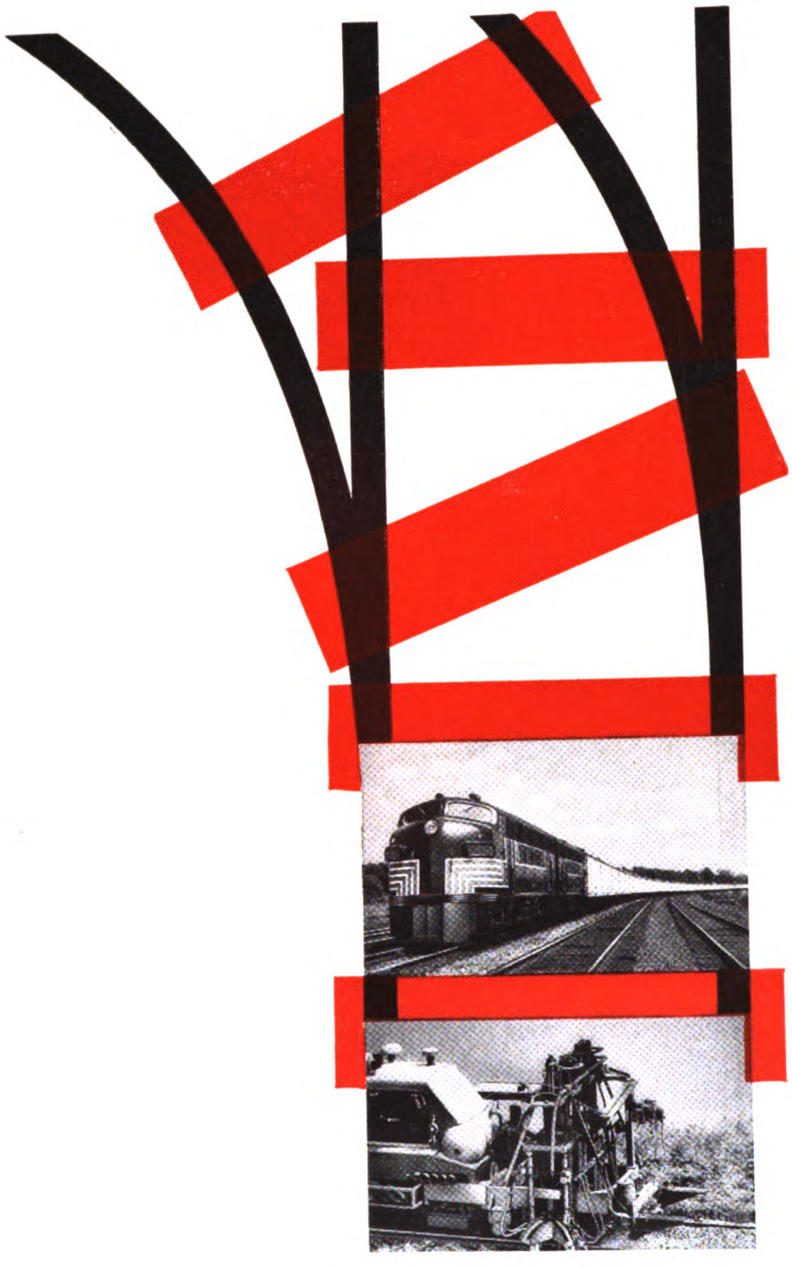

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ESSO DIOL RD 77—Specifically developed for the heavy-duty engines of modern locomotives, Esso Diol RD 77 assures peak efficiency and long, trouble-free engine performance—high standards that mean extra lubrication economy.

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Skilled Esso technicians are ready to analyze your petroleum needs and recommend the best fuel or lubricant for your diesel equipment. For information or technical assistance, call your local Esso office, or write: Esso Standard Oil Company, Railroad Division, 15 W. 51st Street, New York 19, N. Y.

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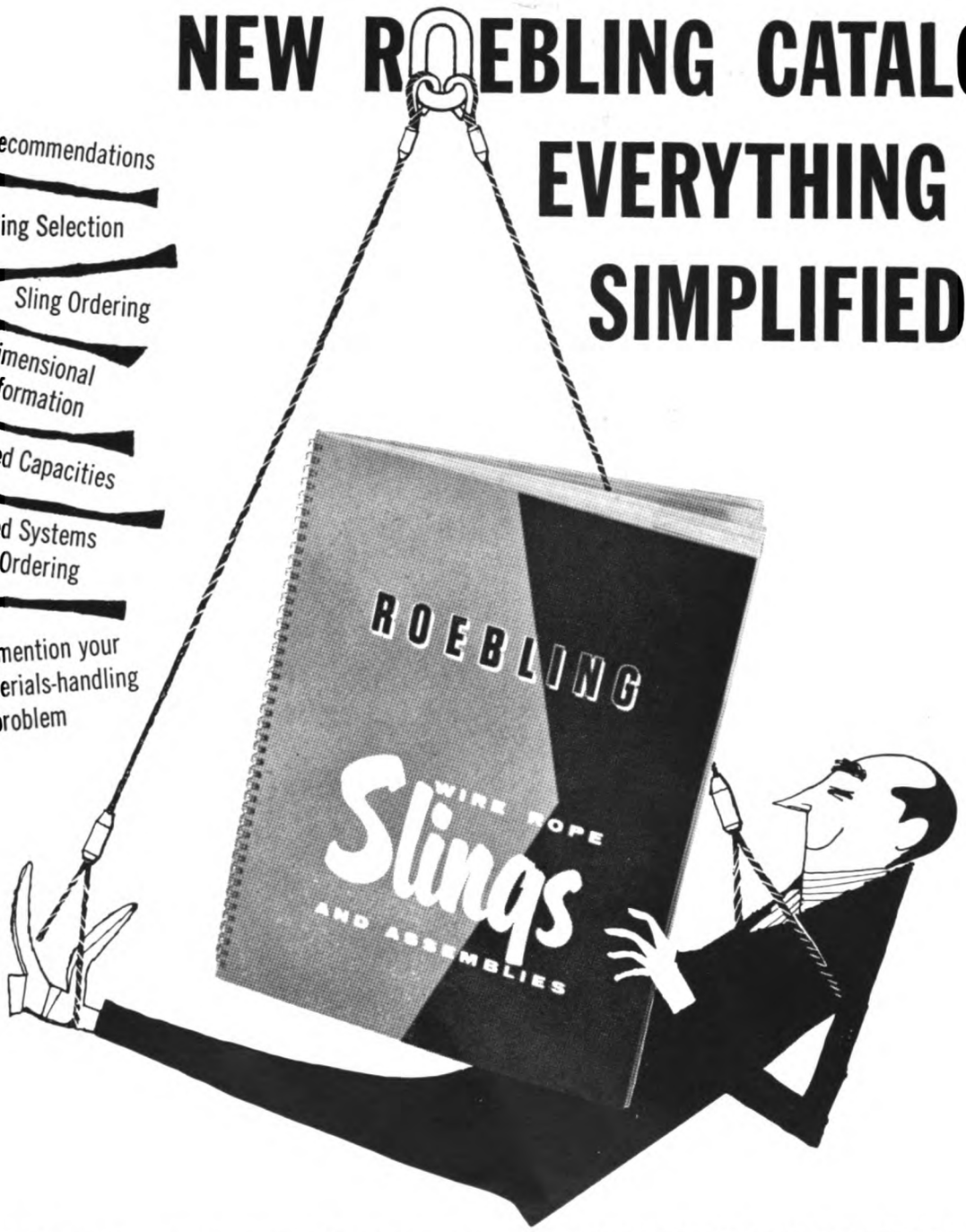

This 52-page book contains concise, easy-to-find and easy-to-use information on:

All-Purpose Slings · Roegal® Cable-Laid Slings · Flatweave Slings
Railroad Slings and Special Assemblies · Fittings
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The text is supplemented by drawings and photographs. This wealth of reference is yours simply for the asking. By filling out the coupon and mailing it, you'll get your copy *faster*.

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He has ridden thousands of miles at the business end of all types of trains.

He knows air brakes, as he must, to adequately appraise their operation and maintenance.

He's thoroughly trained and experienced. He will see to it that your braking system operates to meet your exacting requirements.

Westinghouse Air Brake Service Engineers, like this man, are on call all the time to check a new installation or consult with you regarding air brake matters.

They roam the country, and the world, for one purpose: to make sure that Westinghouse Air Brakes operate correctly, dependably and efficiently.

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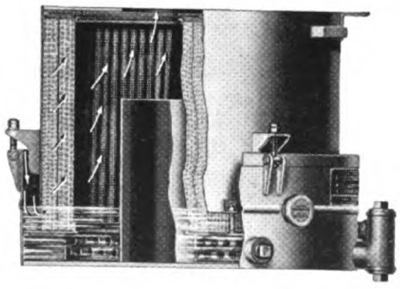
REPORT FROM A LEADING MIDWESTERN RAILROAD*:

"One Air-Maze oil bath air filter has saved $4385.79 in 27 months!"



HERE are the dollar-and-cent results of a leading midwestern railroad's 27-month test of an Air-Maze oil bath air filter. These results show the sound, economical reasons why dozens of top-flight railroads are switching to Air-Maze oil bath filters for air intakes on hundreds of diesels in freight, passenger and switching service. These are the facts from the actual report:

"Savings with Air-Maze oil bath filter for 27-month period from December, 1953 to April, 1956, are:

Reduced cost of power assembly change-outs	*$2880.00*
Reduced cost of servicing	*1505.79*
Total savings for 27-month period	*4385.79*
Annual savings	*1949.24*
Rate of return on investment for oil bath filter	*354%*

Formerly the engine was equipped with panel filters that had to be cleaned and changed once a day. The oil bath filter needs servicing only once every three months. Equally outstanding are the facts about the Air-Maze oil bath filter's efficiency. The oil bath filter is effective at *all* engine speeds—does not depend on high air velocity to do a top filtering job. It works effectively at low pressure loss . . . is not affected by humidity or oil mist conditions.

According to recent, extensive testing by an independent laboratory (which was selected not by Air-Maze, but by one of our customers), the Air-Maze oil bath filter removes 59% more fine Arizona road dust than the next best filtering device in use today.

If you want to cut both *filter* and *engine* maintenance costs as well as extend power assembly life, it's time to equip your diesel locomotive with Air-Maze oil bath filters. For further information, see your locomotive builder or write the Air-Maze Corporation, Cleveland 28, Ohio.

* Additional data furnished on request.

The biggest names in diesels are protected by Air-Maze filters

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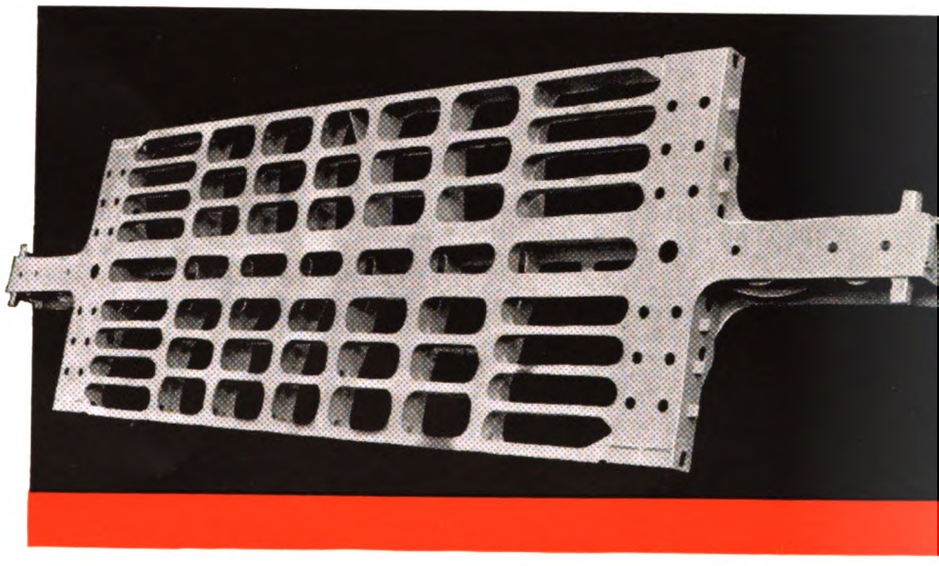
Specially designed, providing rugged stamina for continuous, dependable service!

New Santa Fe Ore Cars with Maintenance-Free Commonwealth One-Piece Underframes will withstand heavy punishment!

These Santa Fe ore cars are sure to stand up under the *ruggedest* kind of service—the handling of copper ore—and remain in continuous operation! These new high capacity cars have clasp brake trucks with 6½ x 12 axles. They're specially designed with Commonwealth one-piece cast steel underframes providing exceptional strength at minimum weight, and assuring maximum availability—increased revenue.

The greater impact value of cast steel and the one-piece underframe design withstand ore loading impact better than other types of construction. Our years of experience in the design and production of Commonwealth Underframes have resulted in the elimination of costly maintenance.



Whether you require ore cars, flat cars, pulpwood cars, sulphur-carrying cars, well cars or depressed center cars, build with Commonwealth Underframes—and benefit from these advantages.

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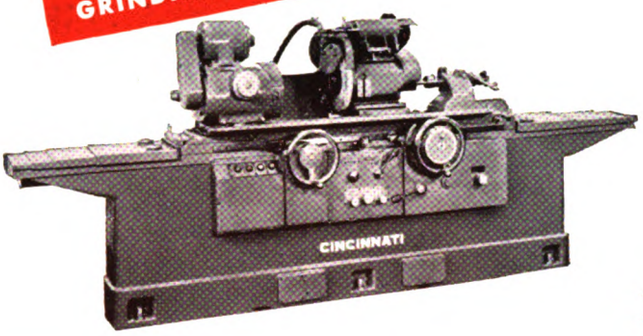
Cincinnati's setup timesavers

reduce cost of your small lot precision grinding

CINCINNATI® FILMATIC 12" x 36" UNIVERSAL GRINDING MACHINE



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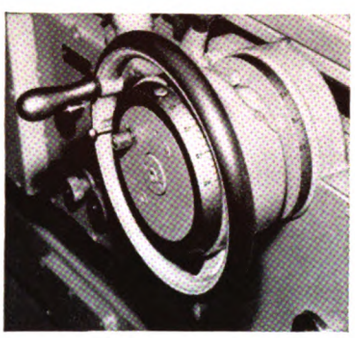

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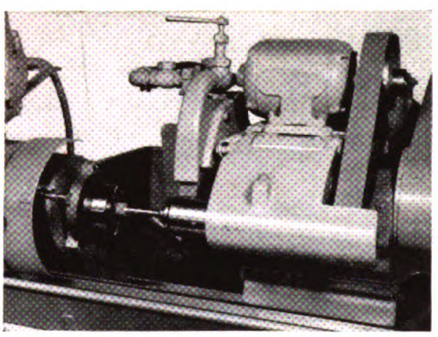

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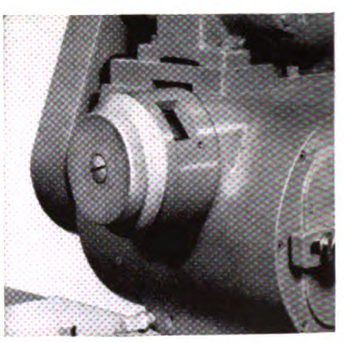

Small manufacturing quantities may be good for inventory accounting, but they're tough on costs. In precision toolroom grinding, CINCINNATI® FILMATIC Universals offer several ways to eliminate or greatly reduce the setup element of cost.

1 **Power rapid positioning** of wheelhead. Saves time and energy, especially when setting up for widely varying diameters (extra equipment).

2 **FILMATIC grinding wheel spindle bearings** require no adjustment for any job assigned to the machine.

3 **Two-speed cross feed mechanism** facilitates multiple diameter grinding; incorporates pickfeed all the way to final size.

4 **Internal grinding unit** is hinged at the front of the wheelhead casting, always ready for internal work.

5 **Instant work speed selection** for the diameter being ground. Just turn the dial with one hand, that's all there is to it.

Other ways in which new CINCINNATI FILMATIC 12", 14", 18" Universal Grinders can reduce costs in your shop are outlined in catalog No. G-663-1. May we send a copy to you? You will find brief specifications in Sweet's.

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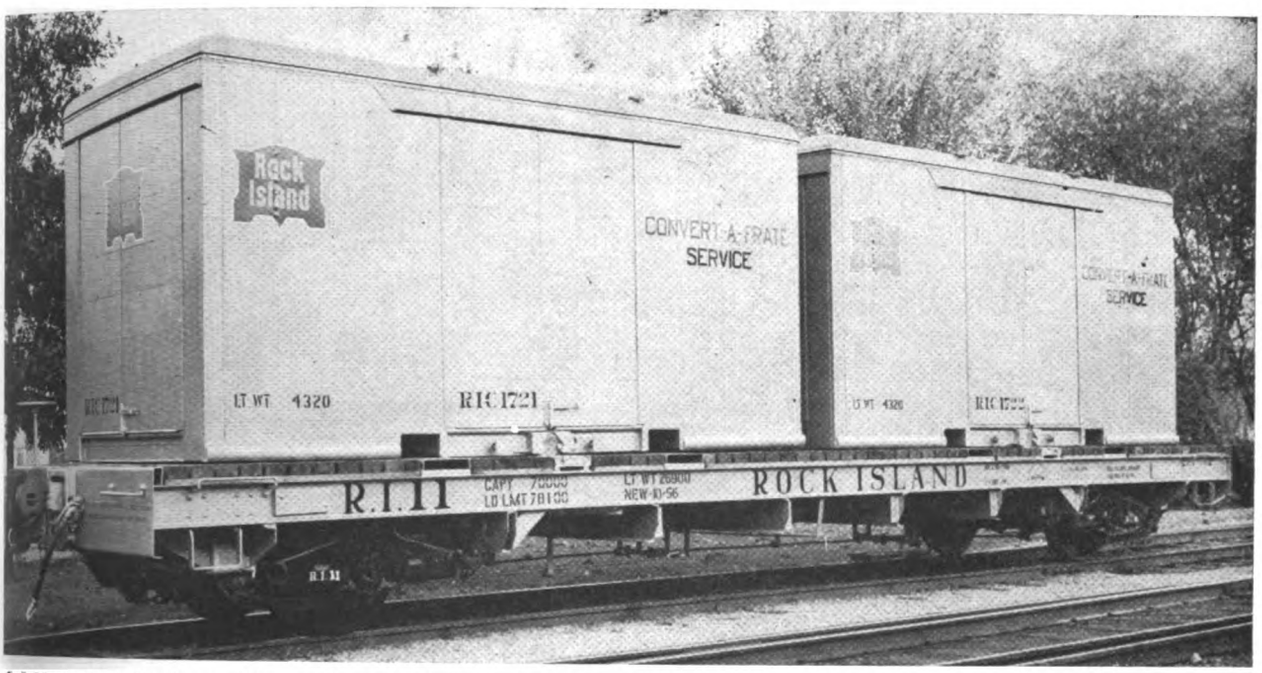


Rock Island ordered fifty Adapto flat cars. Containers delivered included sixty 17-ft boxes, twenty 17-ft gondolas, and ten 35-ft boxes.

Let's Look At These Four-Wheelers

Rock Island is now operating nearly 50 "Convert-A-Frate" cars arranged for handling demountable cargo units; others of these ACF Adaptos are under test in "Truc-Train" service on Pennsy.

ACF Adapto is on its way on the Rock Island. By the end of the year, the road was operating 43 of these cars in revenue service. These RI cars are arranged to handle the removable gondola and box units which were also supplied by ACF. After delivery, the Rock Island built automobile carriers for the cars, and encouraged the construction of a refrigerated box which is now in use. These Adapto cars are also being tested in piggy-back trains on the Pennsylvania.

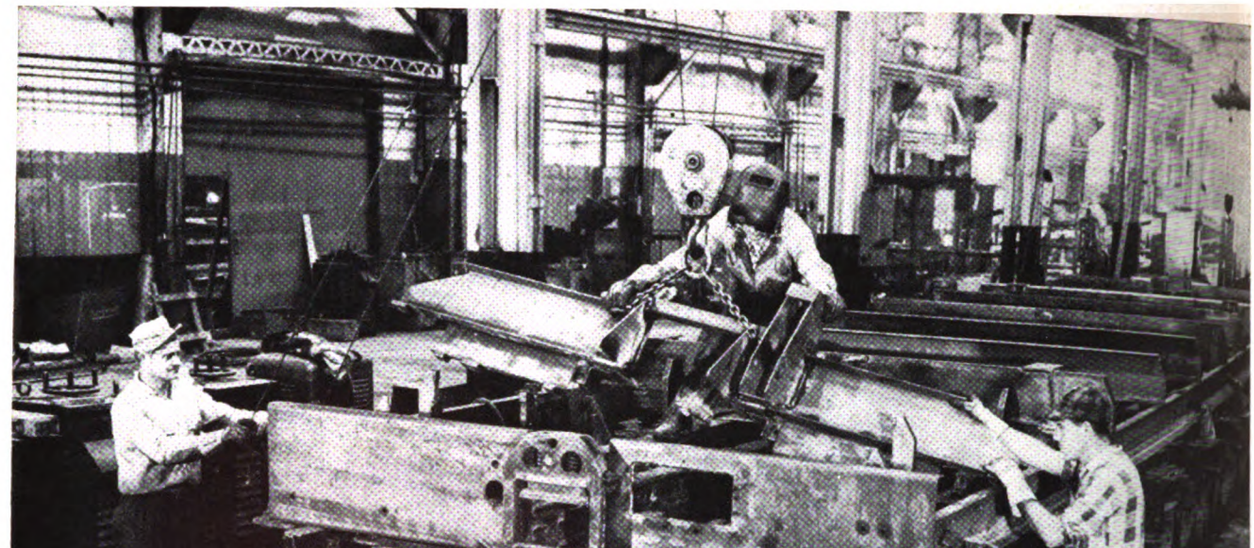
The car itself is a radical departure. Until nearly the turn of this century, there were many four-wheel coal cars in service on numerous American railroads. There seems to be little doubt that this newest fleet is the largest group of four-wheelers built and successfully operated in revenue service here in many years.

The center sill for this car is composed of two 41.2-lb AAR Z-26 sections extending the full length of the car. This sill is reinforced along its center 12 ft with a ⅜ x 5-in. bar welded under the joint between the two Z sections. A ⅜ x 2½-in. bar is welded on the top surface of each of the bottom flanges of the center sill for the same 12-ft length.

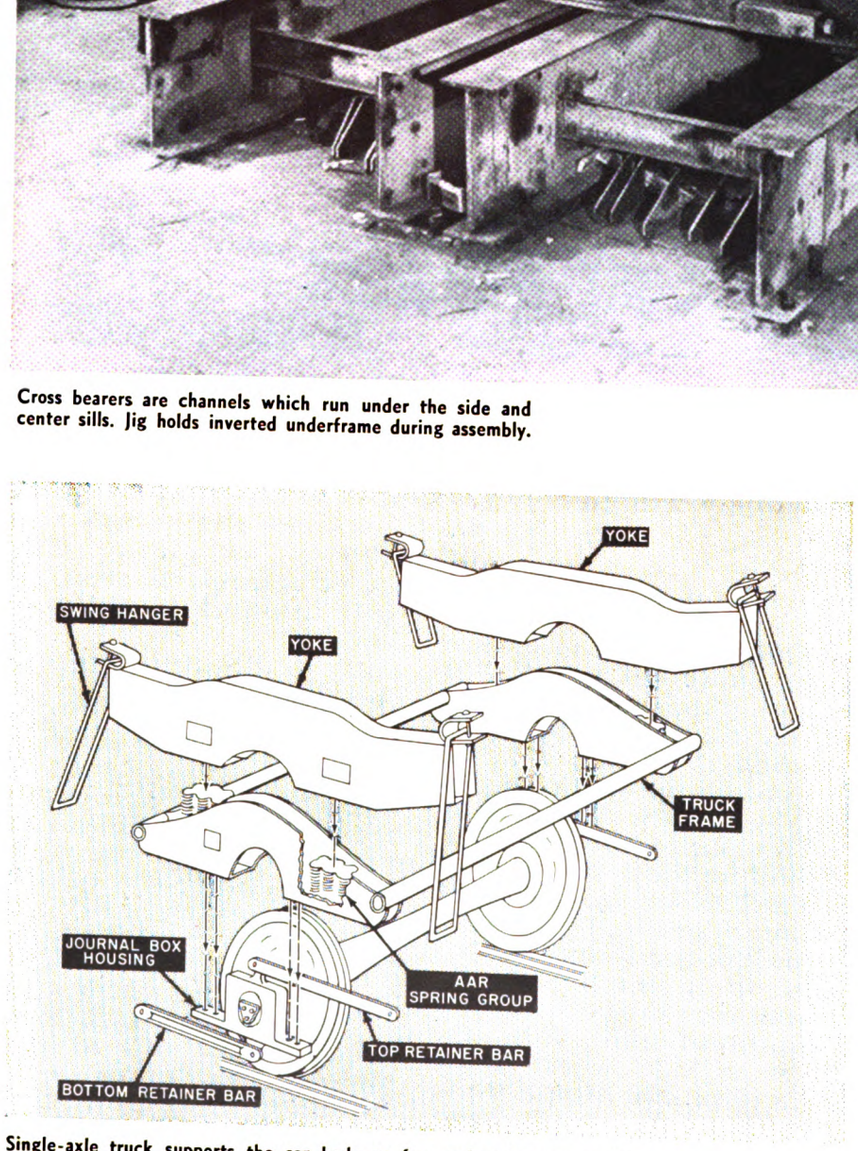
Side sills are 9-in., 13.4-lb LAHT channels which are connected to the center sill by eight 10-in., 15.3-lb channel cross bearers and by two ¼-in. pressed end sills 19-in. deep. There are eight diagonal braces made of the same channels which are used for the side sills. These braces form an "X" in each of the floor panels between the cross bearers just inboard of the trucks. The entire underframe is a welded assembly.

Self-Clearing Floor

The flooring is 2¾ x 5½-in. treated decking spaced to be self clearing. This decking does not extend the full width of the car, but only out from each side of the center sill. The top of the decking is flush with the top of the center sill. It is attached to angles on each side of the center sill, to channel-type floor stringers, and to the tops of the side sill channels with ½-in. Nelson end-welded studs and watertight nuts. At the four points where the forks of the lift trucks contact this platform in unloading the 17-ft containers, the deck is floored with



Cross bearers are channels which run under the side and center sills. Jig holds inverted underframe during assembly.



Single-axle truck supports the car body on four swing hangers as illustrated in this Railway Locomotives and Cars sketch.

pressed steel channels instead of the wood used over the remainder of the surface.

The Waugh twin-cushion draft gears are applied in the conventional manner at the ends of the center sill. Forged rear draft lugs are riveted into the sill, while the combined striker and front draft lug assemblies are welded in at the ends. The cars have bottom-operated, Type F, interlocking couplers. The top of the car's deck is just above the top of the couplers, just $41\frac{7}{16}$-in. over the rail.

Adapto Truck

The Adapto single-axle trucks applied to these cars are connected to the body through swing hangers supported at brackets on the cross bearers. This swing-hanger suspension is a departure from the arrangement previously used on American

four-wheelers which have usually had their two single axles guided in pedestals fixed to the car body. The loop-type swing hangers are inclined to make the Adapto truck self centering while permitting some lateral motion between it and the body.

The Rock Island cars have AAR standard 6 x 11-in. Bethlehem axles and 33-in. Southern one-wear cast-steel wheels. Axles are equipped with Timken AP roller bearings. Each roller bearing assembly is carried in a cast steel housing under a Fabreeka pad.

Each truck frame is composed of two side frames connected by two 4-in. steel pipes. The journal box housings are bolted into the side frames which are pressed from $^{5}/_{16}$-in. plate and are shaped to provide space for two groups of standard AAR coil springs—one group on each side of the journal housing. This makes a single unit out of the wheel and axle set, the journal bearings and housings, and the truck frame.

The coil spring suspension of each truck is four nests of five coils each. These are the AAR 1947 alternate standard design springs with $3^{11}/_{16}$-in. travel. Resting on the two spring groups on each side frame is a ¼-in. steel pressed yoke which has the truck swing hanger brackets applied at each end. This yoke also has the bracket for the transverse yoke retaining bars.

The axles are kept at right angles to the car's longitudinal center line through the upper and lower retainer bars applied to the truck side frame. The lower bar on each side is fastened to the end cross bearer of the body, and the upper bar is pinned to an intermediate body cross bearer. These yokes are kept in lateral alignment within the side frames through yoke retaining bars attached to the yoke and to the tubular side frame connecting members. All of the pins in these aligning mechanisms are carried in rubber-mounted bushings requiring no lubrication. Attached to the inboard side-frame connecting member of each truck are two Monroe, strut-type hydraulic shock absorbers which are then fastened to the adjacent body cross bearer.

Brake System

The Rock Island cars have Westinghouse AC brake equipment actuating individual truck-mounted cylinders on each wheel. Each cylinder then operates a single Cobra brake shoe against the wheel through a lever pivoted at the side-frame connecting member. Despite the individual cylinders, the cars have Creco #18 brake beams, loop-type brake hangers, and the conventional wear plates and safety supports.

The light weight of the car is 27,000 lb. The length over end sills is 38-ft, the width over side sills is 9-ft 4-in., and the wheel base is 27-ft. The capacity is 70,000 lb and the load limit is 77,900 lb.

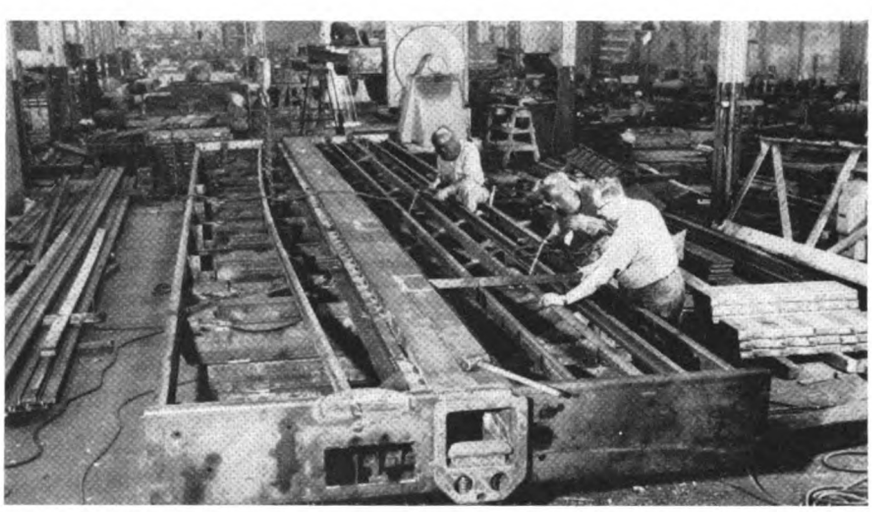
In addition to its containers, ACF has been developing high-speed anchoring mechanisms to attach these demountable bodies to the car. Also developed is a retractable trailer hitch for cars assigned to piggy-back service.

Rock Island Experience

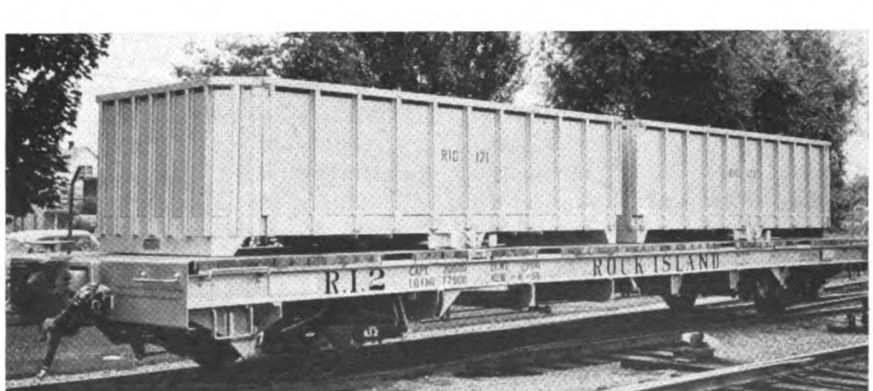
When the Rock Island first put its "Convert-A-Frates" into service, they were hauled near the rear of trains. Today these four-wheelers are handled at any location throughout a train. The road has experienced no derailments, and imposes only a normal speed restriction when moving them through sharp turnouts. There have been no tests made with these cars in hump classification yards.

Rock Island test department studies have shown good vertical ride characteristics. The cars are handling a twice-weekly meat run from St. Joseph to Chicago. This meat is handled from the Swift & Co. plant in the plastic refrigerated unit equipped with meat hooks. There have been no cases when meat tore through the hooks—an indication of the riding qualities.

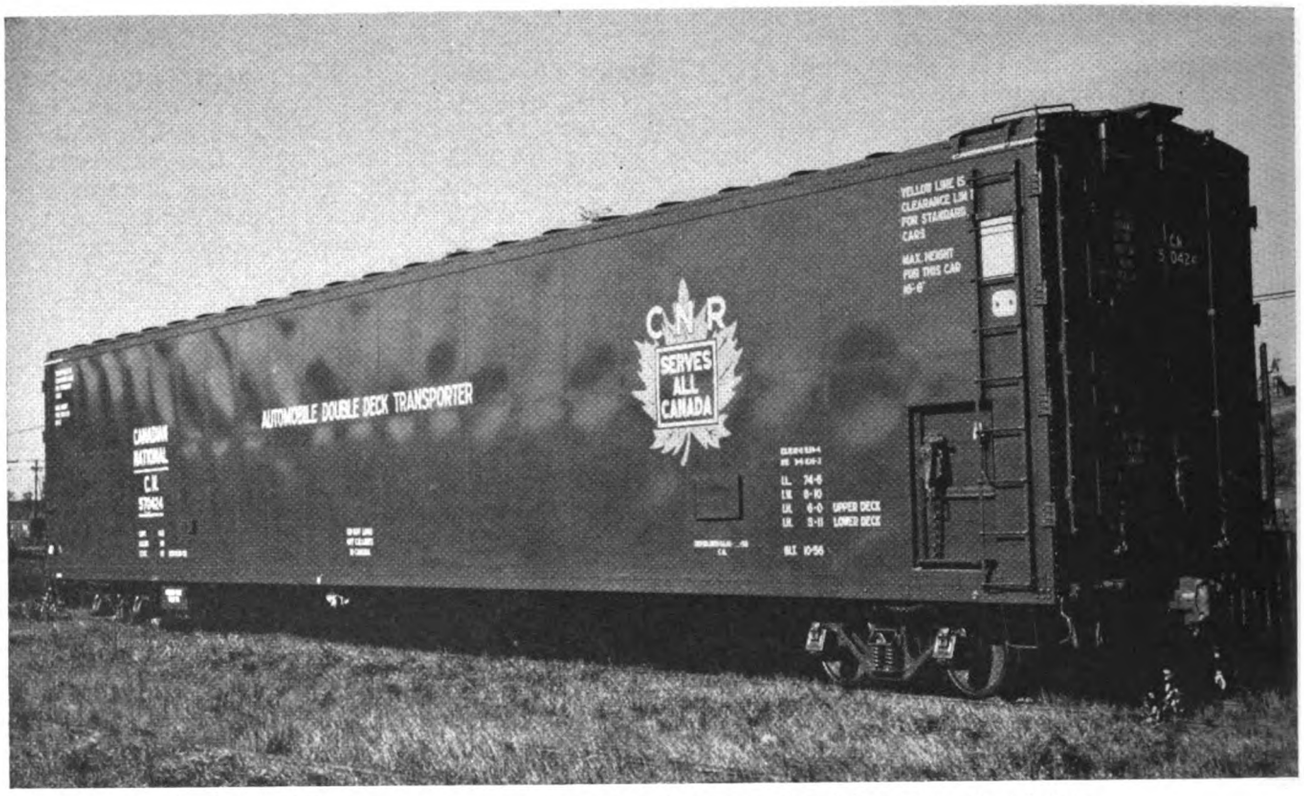
Rock Island inspections have shown the welded truck assembly has been satisfactory; a point of concern when the cars were first delivered. From a mechanical standpoint the entire truck was found to be in excellent condition.



Three floor (above) stringers support the wood decking between the center and side sill on each side of the car.



Another type Adapto container on flat car.



Auto transporter has length of 78-ft. During design the idea of side loading was discarded; car has only end doors.

An "overgrown box car" . . .

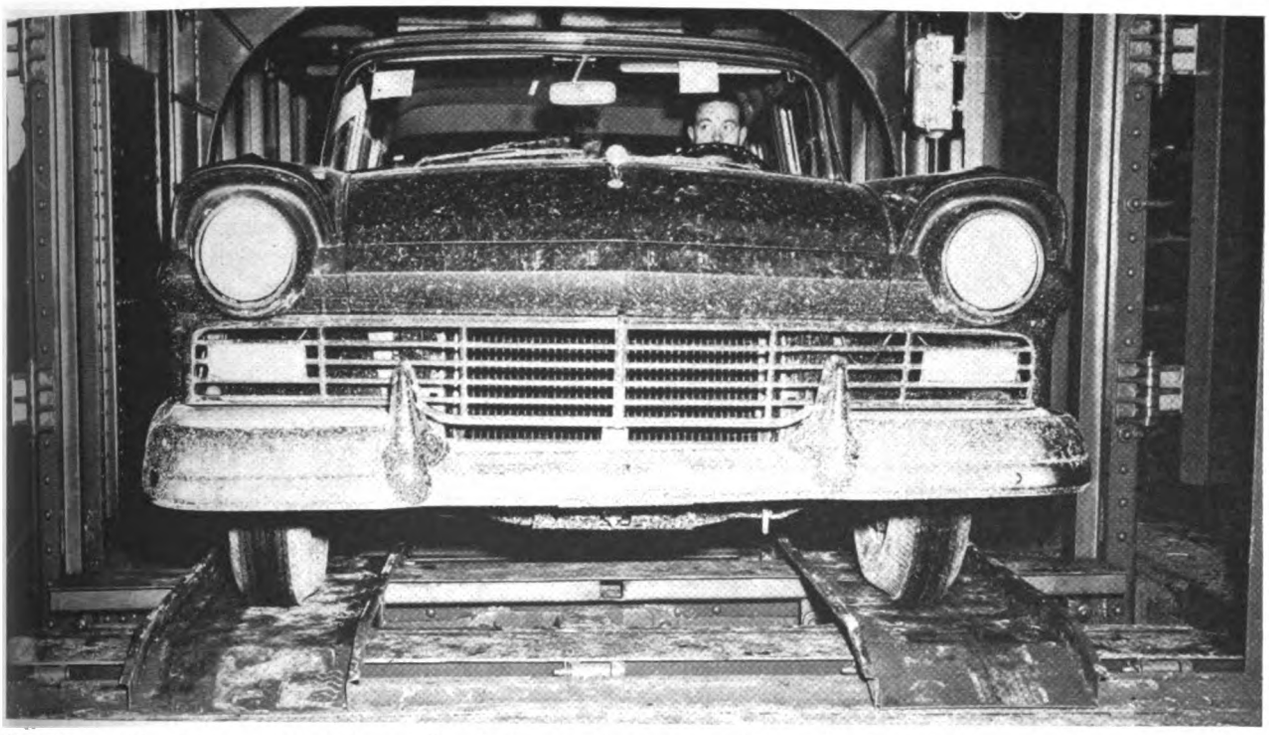
How CNR Automobile Transporter Was Developed

Not satisfied with compromises represented in conventional automobile cars, Canadian road went all out to design special "automobile transporter" and now owns 25 such cars.

The Canadian National has started revenue service with twenty-five double-deck automobile transporters. These big 78-ft cars are in service between the Canadian automobile assembly plants in southern Ontario and destinations in Eastern Canada. The cars were built by Canadian Car & Foundry, and their delivery is the culmination of three years' efforts by the research and development department and by the mechanical department of the CNR.

The project was started when CNR management became concerned about the road's competitive position in the movement of new automobiles from factories to dealers. Even though the door arrangement and dimensions of the standard automobile car vary from those for the standard box car, the automobile car is really designed to spend a good portion of its time handling shipments other than automobiles. Even so, the CNR finds that the width and position of the doors of the conventional automobile car make it unsatisfactory for such services as the movement of loose grain. At the same time the loading of automobiles in such cars is complicated, time consuming and expensive. These factors are reflected in rates which must be charged for the movement.

The project assigned to the CNR research and development department was a study of the handling of automobiles in the conventional automobile cars, and of the possibilities and economic advantages of moving this traffic in specialized cars. The specialized car study expanded. Economic studies of capacity indicated that a car carrying eight automobiles promised the greatest return on investment. During the study, cars which could handle four and six automobiles were considered. Gradually the au-



Sliding floor assemblies—four on each deck—provide shock protection to automobiles anchored on them.

tomobile transporter was taking form. The decision was made to attempt to design such a special car.

Once the decision was made, these general design principles were established:

1. Automobiles should be completely protected from weather.
2. Capacity of the "transporter" would be eight automobiles.
3. Outside dimensions of the "transporter" should not restrict movement of the car on most of the main lines and industrial sidings of the CNR in Canada. The car would not be designed for general interchange service.
4. For loading and unloading, automobiles should be driven on and off the "transporter" under their own power.
5. Securing automobiles on the car had to be done rapidly and in a manner which would protect them from damage.

When it was determined that the car's capacity would be eight automobiles—instead of four or six—Research and Development considered a number of radical arrangements in an attempt to keep the car's length to a minimum. "Tilted" loading was found to require an involved mechanism, and the overall length of today's automobiles would not permit enough angling to significantly shorten the car.

Having decided to use horizontal loading, consideration was given first to a depressed center, and also to depressed runways to lower the automobiles even further. The depressed center of the car would permit an upper deck over this area without exceeding the height of the standard freight car. But during unloading, automobiles would still have to move off over the bolster and car-end construction which could not be lowered. The depressed center was then discarded, and a two-high flat deck arrangement with a minimum clearance of nearly 6-ft over each deck was adopted. The car's overall height would be greater than that of standard cars.

The car was beginning to take form. The basic automobiles to be hauled are assumed to have an overall length of 18-ft, a width of 6-ft 10-in., and a height of 5-ft 6-in., and represent the typical medium priced models. The design was calculated for automobiles weighing 4,500 lb. With the requirement that there be complete weather protection, it was established that the car would be of the box car type. This allowed the use of many conventional box car components and much of the design duplicates arrangements standard with box cars. The car body is just over 10-ft wide because of its length. Design constants were longitudinal accelerations of 8 G for dead loads and 4 G for live loads. Vertical and lateral accelerations were each assumed to be 1 G for dead loads and ½ G for live loads.

The underframe is 75-ft 8-in. over the welded strikers and is built around two AAR 41.2-lb center sill sections. Each of the body bolsters is of the double diaphragm type. The four 3-in., Z-section floor stringers are also carried on four crossbearers and on seven crossties. The car has 6 x 3½ x $\frac{5}{16}$-in. angles for side sills and each is reinforced with a 6-in., 15.3-lb channel.

The final design has no openings in the car sides. These sides are built around 3-in. Z-section side posts which extend up to W-section, rolled side plates. Conventional 0.10-in. rolled copper bearing steel sheet is used for side sheathing. These cars are not lined and are almost completely riveted. The roof is a standard, diagonal panel assembly.

On top of each of the bolsters is a welded, two-story, rigid frame structure with vertical legs of 6-in. WF sections and with cross beams composed of ½ and $\frac{5}{16}$-in. plate under the second deck and under the roof. The side construction described above was known to be more than adequate to carry the vertical loads when the car is loaded, particularly with the absence of side

doors. Side loads were another thing. The open ends of the car would not provide the lateral strength of conventional box car ends. The rigid frames give lateral strength to the car structure. The second deck is carried on these frames and at supports on each of the side posts.

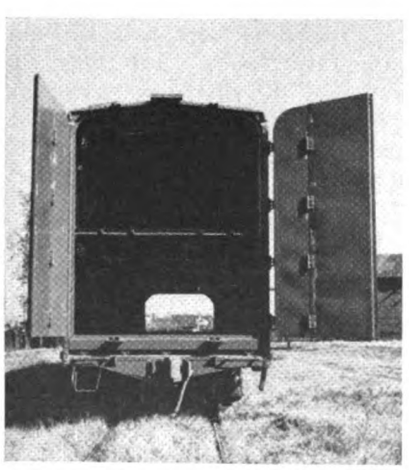
The second deck is a "battledeck" type of floor construction—¼-in. plate over a framing of 3-in. channels, angles and tees. The first deck is steel plate welded to the conventional underbody supports. Installed both on the first and second decks are the "sliding floor" assemblies—each capable of holding one automobile and four on each level. Each sliding floor is composed of two 18-in. x ¼-in. steel strips spaced at the conventional automobile wheel "gauge" and separated by an angle frame. On the outer edges of the two strips are punched angles to which the automobile is fastened. Approximately opposite each wheel location on this "sliding floor" is an outrigger which anchors two extension springs. These springs extend in opposite directions toward the two car ends and are then anchored in the car floor. This means that there are eight springs in the shock absorbing mechanism for each automobile—four effective in either direction. There are blocks on the car floor to prevent the lateral movement of the "sliding floor," and stops beyond its two ends which permit 6-in. of end movement in either direction. Tests have shown that an end acceleration of 2 G's in the car produces an acceleration of only ¾ G in an automobile anchored on this shock absorbing mechanism.

At one time during the development, considerable work was done on incorporating upper-deck loading ramps within the car. This required an elevating mechanism on these pivoted, upper deck sections, and introduced structural complications. Suitable ramps (actually two sections of the upper deck) were so long that they eliminated any possibility of side loading; and it was during this phase of the development that the end-loading principle was definitely fixed. The complete car design was well developed when a meeting with automobile manufacturers developed the fact that these shippers would be willing to use separate, external ramps which were not part of the transporter. It was agreed that such a ramp should be portable, and easy to handle and assemble.

The ramp is arranged only to bring automobiles from the second deck level to the first deck level since all these cars will be unloaded at points which have a car-floor height, end-unloading platforms. The ramp will be assembled on that platform. It is a three-piece steel structure which can be handled by two men. By incorporating suitable vertical curves in the structure, overall ramp length was kept to a minimum.

Each end of the car is fitted with two folding doors and with a hinged threshold plate extending completely across the bottom of the end opening and completing the closure at the car end. Doors could not extend down to the end sill because it would be impossible to open them at unloading platforms. At the same time the car floor could not be raised without increasing the overall height of the car. The end doors had to be

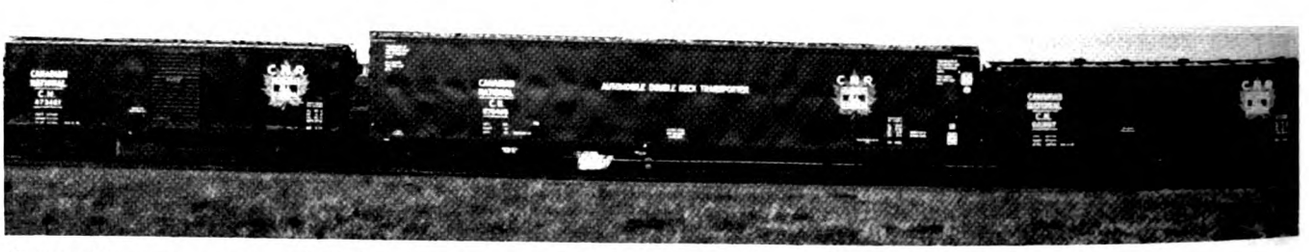
(*Continued on Page* 50)



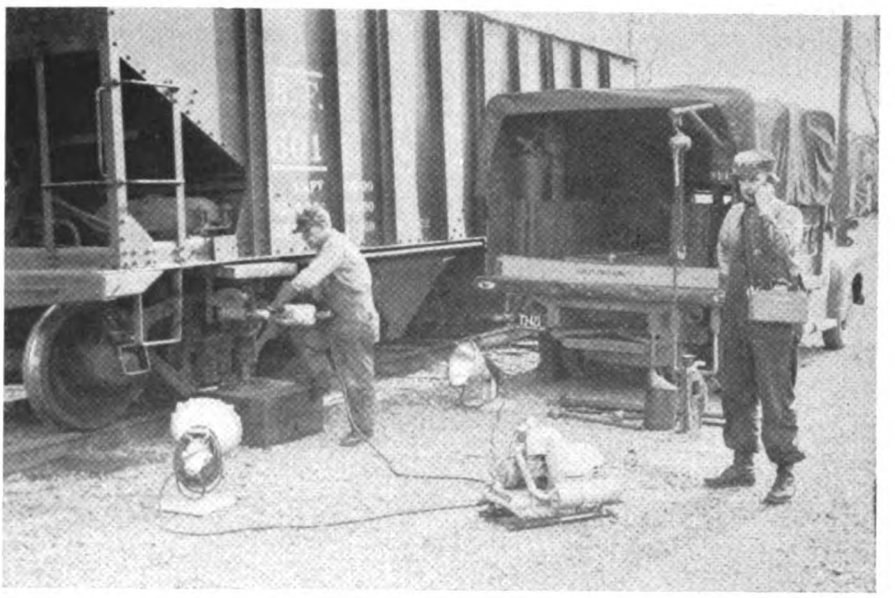
Double folding end doors were required so they could be opened between coupled transporter for "circus" loading.

Anchored for shipment, automobile is held through hub attachments on all four wheels and chains to sliding floor.

Hub attachment is key to securing autos in transporter; it accommodates all manufacturer's wheel mounting studs.



"Big boy" between conventional 40-ft box cars accents the transporter's length and 16-ft 6-in. height.



RF&P trucks carry power tools, floodlights, and a small generating plant to assist in making rapid repairs to passenger and freight cars. In some cases it has not even been necessary to set the cars out of trains.

This Car Department Keeps Them Rolling

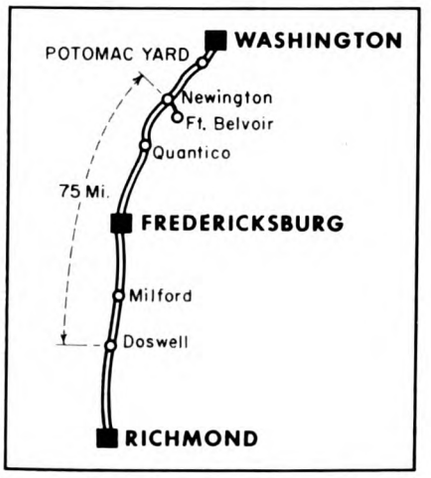
RF&P car forces use highway trucks, radio and special tools to keep freight and passenger equipment on the move over the heavy-traffic Richmond-Washington route.

The strategic, double-tracked Richmond, Fredericksburg & Potomac extends 113 miles from Washington, D. C., to Richmond, Va. It handles all the Atlantic Coast Line and Seaboard passenger trains enroute between Washington and southern points. Freight traffic for and from the B&O and Pennsylvania at Potomac Yard is moved to and from connections with the ACL, Seaboard, C&O and Southern at the RF&P's south end. Much of the freight traffic is perishables.

At the mid-point of this busy route is Fredericksburg, Va., where the RF&P has a highly mobile car force. This group consists of a supervisor and 12 inspectors who cover round-the-clock assignments. At Fredericksburg they work a car repair track which is equipped with flood lights for 24-hr operation. From this point radio-equipped highway trucks cover 75 miles of the 113-mi main line. Emergency or permanent repairs are made to all freight and passenger cars set out or disabled in trains in this territory. In addition, inspection of cars and open-top loads is performed at Doswell, Milford, Quantico, Woodbridge and Newington, and for the military installations at A. P. Hill, Quantico and Fort Belvoir.

The radio equipment on the three trucks at Fredericksburg enables inspectors to communicate with the train dispatcher at Richmond, with

Supervisors and dispatchers contact Fredericksburg car inspectors along . . .



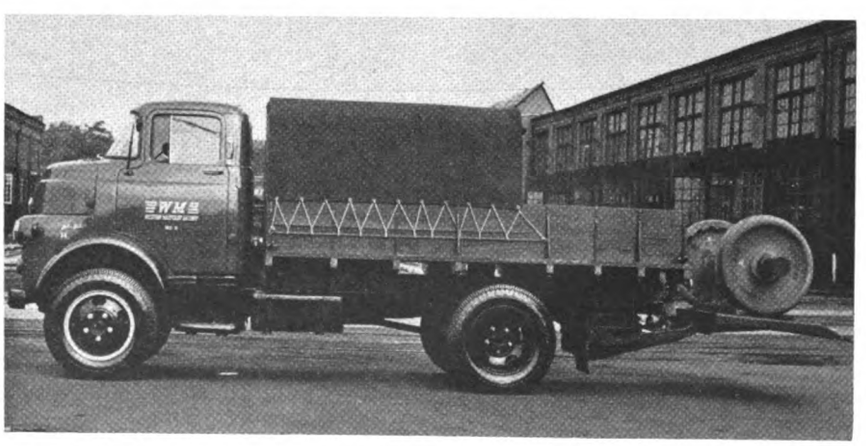
Seventy-five miles of the busy main line covered by these forces in the . . .

Three radio-equipped trucks carrying tools and parts to make rapid repairs.

locomotives and cabooses enroute, and with the mechanical department office at Fredericksburg. There have been a number of cases when car inspectors traveling in these trucks were contacted with the radio by the dispatcher or mechanical supervisor and sent to trains having difficulties along the line. Repairs that were made to cars in these trains made it unnecessary to set out the cars and avoided lengthy delays to the trains.

A similar saving is achieved because inspectors can be directed to inspect cars and loads as soon as the supervisor has been informed by the agent at the point where the cars are located. This speeds service for RF&P customers, and produces savings in labor costs, truck mileage and truck maintenance.

Two of the trucks are fitted with body-mounted side boxes which carry journal bearings, packing, water fire extinguishers, brake rigging parts, coupler knuckles, air brake tools, and other parts and tools needed for most rolling stock repairs. The third truck carries this equipment and material along with additional tools needed for rewheeling cars set out along the line. There are two 35-ton Duff-Norton ratchet jacks and two 50-ton Duff-Norton electric jacks. The electric jacks and two 110-volt flood lights are powered with a Homelite 2,500-watt gasoline generator. This truck also carries an oxy-acetylene cutting outfit and a demountable, portable "A" frame for car truck repairs.

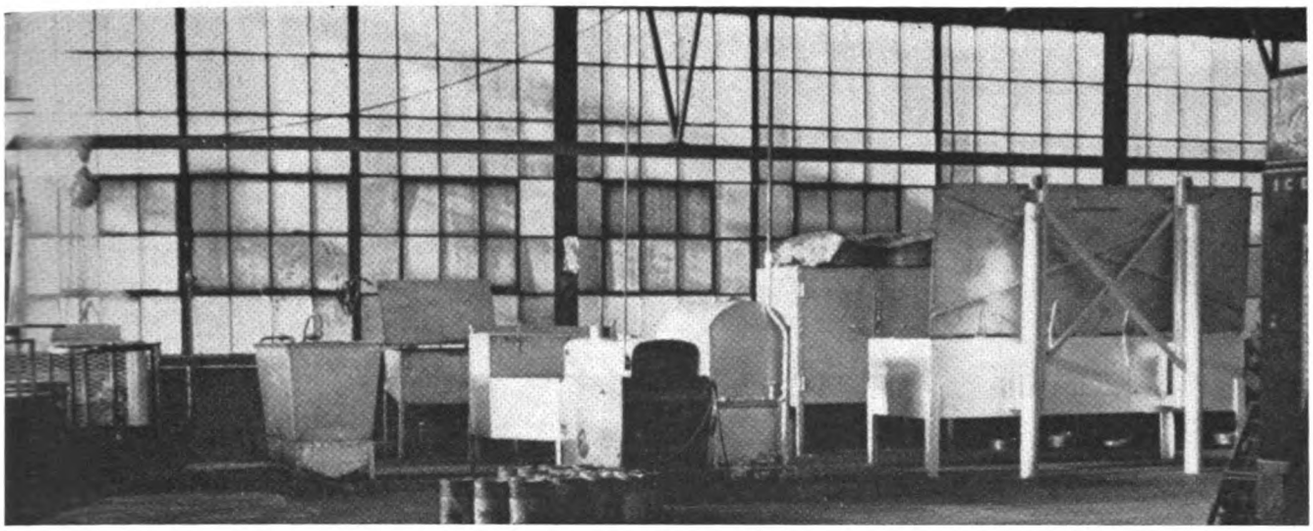


Here's How To Meet Wheel Handling Problem

Toledo, Peoria & Western's Ford truck (top) for changing car wheels along the line has a yoke pivoted at each side of the bed just over the truck's rear wheels. This yoke has a sheave at its center which extends 20-in. over the end of the bed. From a winch just back of the car runs the cable which passes over the sheave to the wheel "hook". A stop on the cable at this hook means that the wheel set being picked up will be lifted vertically until the stop strikes the yoke. The yoke then moves up so that the wheels are brought in over the bed of the truck. After they are over the bed, pins lock the yoke in its nearly vertical position, and the wheels can be lowered to the truck bed.

Western Maryland's two-ton Dodge truck (center) has an Anthony 3,000-lb capacity hydraulic lift gate. Wheels rolled on to this gate while it is horizontal on the ground are lifted up to the bed of the truck. After the wheel set has been loaded, the gate moves on up to a vertical position to completely close the back of the truck body.

The Baltimore & Ohio's car department at Clarksburg, W. Va., has applied a tramrail and hand-operated hoist to a truck (bottom) for the handling of wheel sets and other heavy car material.



Moving down the line from the Magnus cleaning tank at the left, overhead tramway permits mechanized handling through every step in the process.

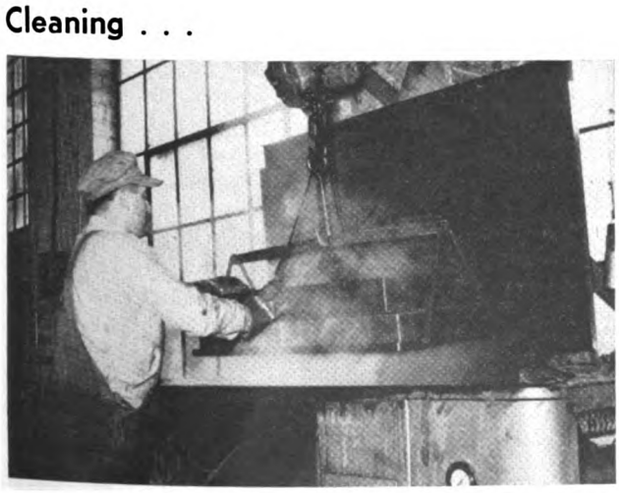
Here's How A Short Line Does It . . .

Cleaning Air Filters on a Production Line

Production line and short line don't always go together when referring to diesel locomotive maintenance. But the Pittsburgh & West Virginia with a total of only 26 units operates a filter cleaning production line. Filters are placed on a carrier when they start through the cleaning process and remain on it until they arrive back at the locomotive to be installed in the filter frames. All this permits rapid cleaning with a minimum of labor—the filter line is a one-man operation. All handling during the cleaning is done with a hoist running on an overhead tramrail which connects all the operations.

The wheeled rack used to move the filters is built to hold a set of dirty filters as well as a set of clean ones so that it is not necessary to make two trips from the filter cleaning line to the locomotive. Dirty filters removed from the unit are placed at each end of the rack while the clean filters are taken from the carrier at its center. Height of the wheeled rack is adjustable. It is low enough to pass through shop doors. When it arrives at the roundhouse where running work is done, it is pulled up with a shop crane and locked at a height where it can be reached from the locomotive running boards.

Cleaning . . .

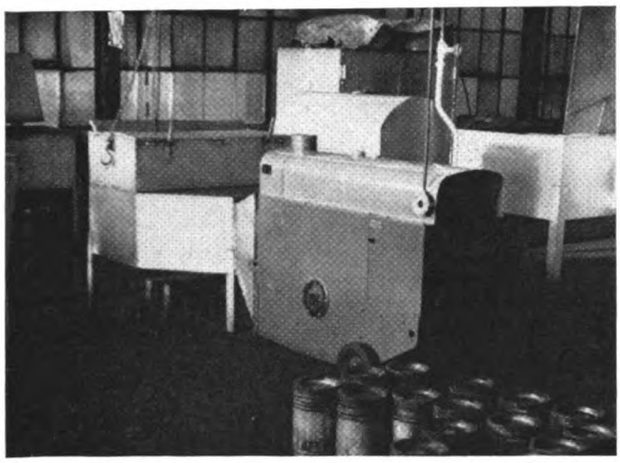


Filters start into cleaning tank which is also used to do the multitude of other cleaning jobs necessary in a diesel locomotive shop.

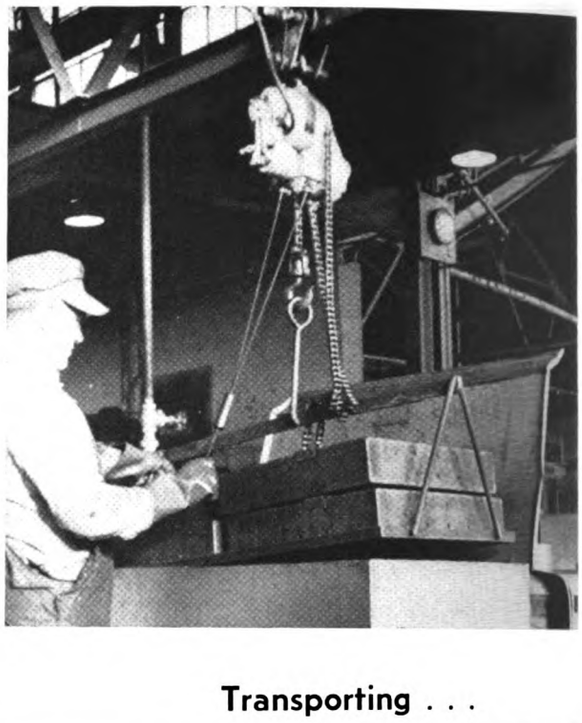
Rinsing . . .

Second step is a rinsing vat where the cleaning solution is flushed from the filters and they are then blown fairly dry with compressed air.

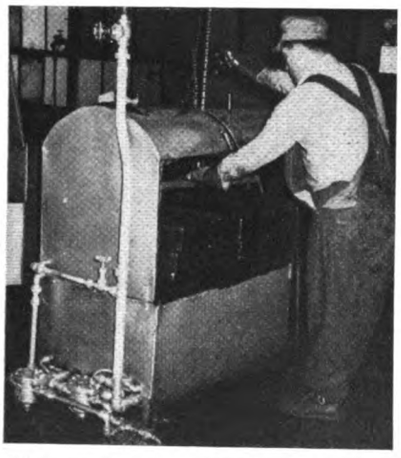
Drying . . .



Portable heater has been permanently connected to drier to supply a large volume of heated air. At every stage in process handling is done by hoist running on the overhead tramrail.



Oiling . . .

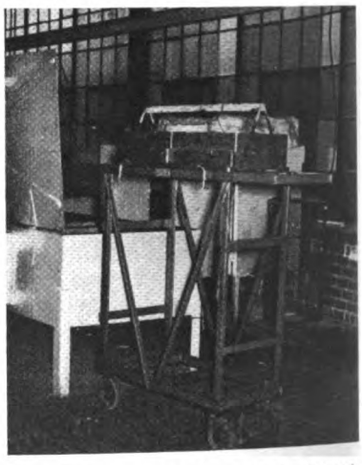


Oiling is done in a tank with a slotted top which permits filters to be hoisted in and out without having an open oil vat in the shop area.

Draining . . .

Last stage is drying cabinet where excess oil drains from filters the oil remaining in them "sets up" to ready them for the locomotive.

Transporting . . .



Rack holds carrier and set of filters for trip to the locomotive. Rack height is adjustable for handling in shop and at the side of the locomotive during filter change.

Automobile Transporter

(*Continued from Page* 46)

the folding type so they could be opened between coupled cars. It is intended to load and unload these cars "circus" style and bridge plates will be used to connect the decks at each level so that automobiles can be driven through a coupled string of these transporters. The end door latching arrangement is similar to that used on refrigerator car doors but much heavier.

Automobiles are usually shipped without the hub caps installed nowadays. This simplified the anchoring arrangement devised by the CNR. The "hub attachment" is arranged to be attached to three of the five automobile wheel studs. It has elongated holes which accommodate the varying bolt circles used by different manufacturers. On to this is slipped an anchoring ring which is retained with a large nut. From the ring run two chains which are pinned to the sliding floor side angles through clevises. The automobile is then retained at each wheel, and the anchoring arrangement can be applied and removed rapidly.

The finished car weighs over 70,000 lb and has a load limit of 110,000 lb. It has Miner A-22-XL draft gears. Its 50-ton, spring-plankless trucks were supplied by Standard Car Truck which also supplied the stabilizers. The car has Westinghouse air brake equipment with a single 10 x 12-in. cylinder, and a Universal "pump handle" type hand brake applied at a recess in the side sheathing at one end. The transporter is fitted with permanent lighting fixtures on each deck, trainline receptacles and connectors, and standby receptacle and cable. This 110-v system is intended to be used during loading and unloading operations.

Supercharging of Two-Cycle Diesels

These units, designed for supercharging, point the way to lower fuel consumption, increased output, and a greater reduction in size per horsepower.

The successful turbocharging of two-cycle diesel engines has been a desirable goal for many years. A satisfactory solution was not forthcoming until suitable turbochargers had been developed with pressure ratios from 2:1 to 3:1. Rapid progress has been made recently with results which more than justify the development efforts expended.

This article is an abstract of three papers contributed by the Oil Gas Power Division of the American Society of Mechanical Engineers and presented at the recent annual meeting in New York. While the data presented here is related mosty to engines used for other service than railroad locomotives the results point the way to future possibilities in railroad motive power prime movers.

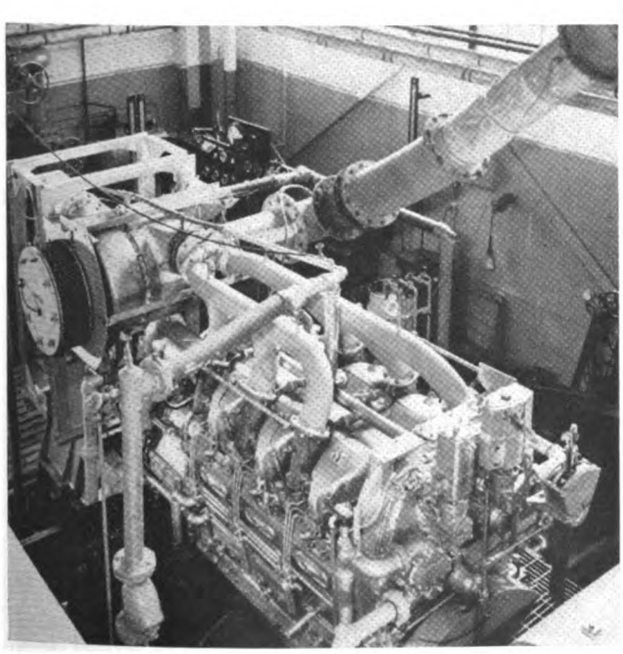
The information on the General Motors engines was taken from a paper by P. J. Louzecky of the Cleveland Diesel Engine Div. General Motors Corp. (ASME paper No. 56-A-100); the Fairbanks, Morse data from a paper by A. K. Antonsen, chief research engineer of that company (ASME Paper No. 56-A-99) and the Napier-Deltic data from E. Chatterton's paper (ASME No. 56-A-141). Mr. Chatterton is chief engineer, D. Napier & Son, Ltd. London.

Engines with small dimensioned multiple cylinders running at high speed can be designed and made lighter and smaller for a given output than those having less cylinders running at a lower speed. This fact has created the desirability for a "high speed diesel". The demand for more horsepower, at the same time limited by a maximum axle load is attracting more attention to this form of locomotive power.

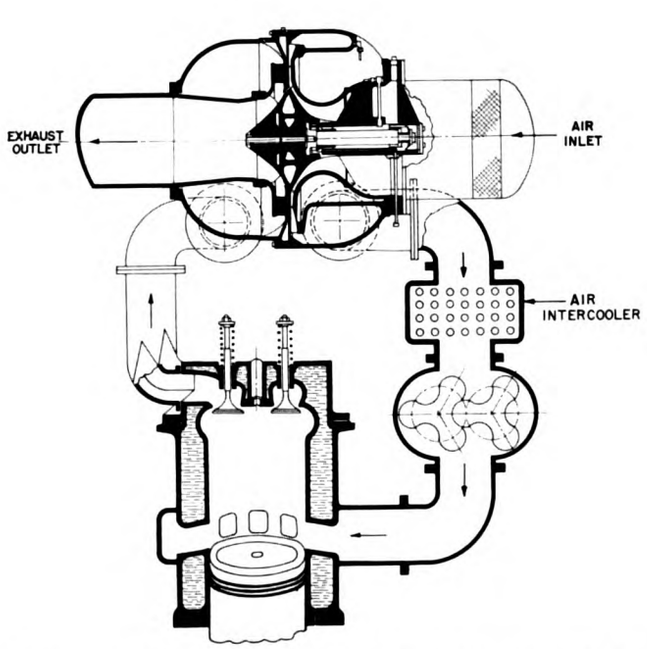
From an economic standpoint, lightweight engines enjoy lower maintenance costs. Readily lending themselves to part interchangeability, they rule out expensive servicing methods or equipment. Engine changes are accepted as a matter of hours, not days. These facts alone may have justified the continued research and development of this engine.

Successful results have been necessarily slow in materializing. It was not until suitable superchargers with 2:1 to 3:1 pressure ratios became available that a practical solution was reached. General Motors, Fairbanks-Morse, and Napier of England have proposed three different solutions to this question of supercharged, two-cycle diesel. Proper matching of charger to engine out of the way, these builders turned their efforts to overcoming the starting and acceleration problems of such an arrangement.

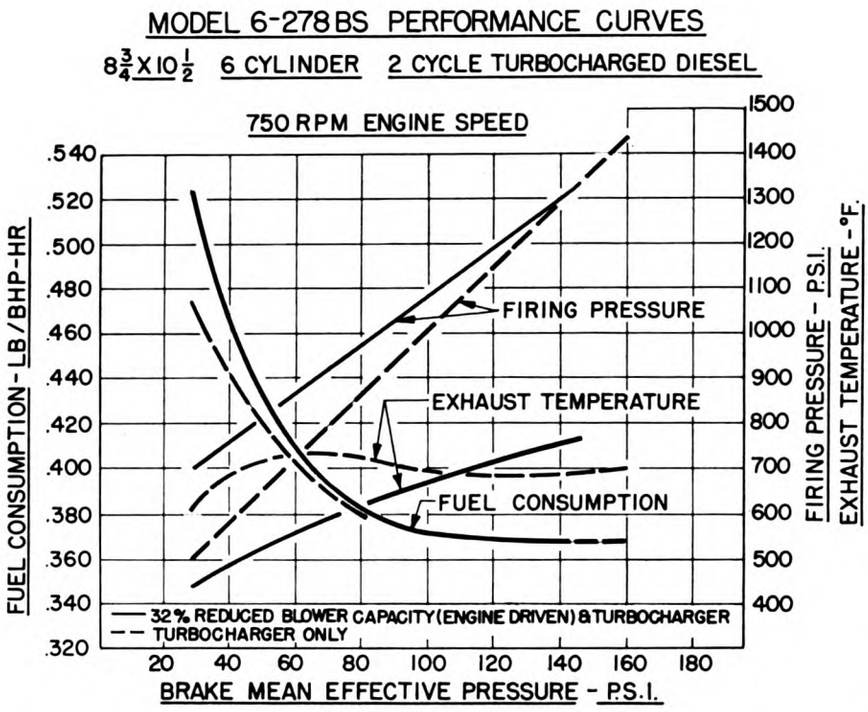
Cleveland Diesel's bid for this type of power is based on a V-type, 6-8-12 or 16 cylinder, two-cycle diesel engine coupled to, in this case, a DeLaval turbocharger. Air, compressed by the exhaust gas energy in this turbocharger is forced through an intercooler maze before entering the standard, positive displacement engine-driven blower. Precooling this air packs more oxygen into the cylinders and greatly reduces thermal problems in the positive-displacement blower. This blower supplies the required air to start the engine and assures a posi-



General Motors' Model 6-278BS two-cycle turbocharged diesel engine in a test stand setup.



A diagram of the two-cycle turbocharging arrangement selected for the General Motors design.



tive amount of air until such time as the turbocharger reaches its true efficiency. It is in this same engine-driven blower that the second stage of compression takes place.

As seen in the picture, a branch type manifold recovers the pulse energy in the exhaust from each cylinder. These two manifolds are joined at a pulse converter, converting the kinetic energy in the pulsations to pressure energy. This is effected by controlling the expansion through a diffuser. Having been slowed down in the converter, the gases pass through the turbine to the atmosphere.

The turbine-driven centrifugal compressor pulls new air through an inlet filter and silencer directing it into the intercooler and then to the driven blower as previously mentioned. Completing the cycle, the engine-driven blower forces this denser air to the engine air box and then to the engine cylinder.

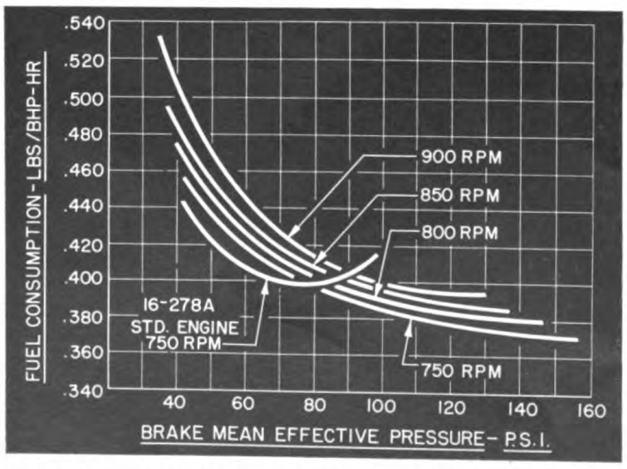
Obviously, when operating at a greater output, a much larger volume of air is needed by any supercharged engine. The density of the air scavenging the cylinder is almost twice that of standard types. The rate of load application to a supercharged two-cycle engine remains a problem, the difficulty lying in the inertia lag of the exhaust-driven supercharger.

The turbocharger-engine arrangement proposed by General Motors has been designated as the Model 498, and embodies these design features. The crankcase is very rigid to withstand the increased incharging and firing pressures. The entire unit is four-corner mounted. The rear two are doweled to the base and bolted. The two front corners have enough tolerance of movement to minimize any thermal stress or distortion.

To reduce bearing pressures and to control torsional vibrations, the crankshaft is greater in diameter than its predecessor's. The design called for floating type pistons again to reduce thermal distortion and increase their resistance to wear. Strap constructed connecting rods permit the use of larger crankpin bearings. In spite of the bearing size, the connecting rods and pistons may still be removed through the cylinder liner. As for the exhaust system, all passages were streamlined as much as possible and proportioned to regulate the gas flow from the cylinder to the manifold. This serves to restrict the acceleration and deceleration of the exhausting gas.

Performance:

It is believed by those responsible at Cleveland Diesel, that this represents a practical answer to supercharging a two-cycle diesel engine. As reported, turbocharging has increased engine output almost 100 per cent over standard engine figures. It was equally encouraging to find that the firing pressure in the cylinders only increased from about 1,100 to 1,350 psi in the turbocharged model. Fuel consumption figures indicated that they are almost proportional to the increase in



Model 16-498 Fuel Consumption Curves 8-¾ x 10-½ 16 Cylinder, Two-cycle Turbocharged Diesel.

		NONTURBOCHARGED DIESEL ENGINE	TURBOCHARGED DIESEL ENGINE
ENGINE MODEL	NO.	16-278A	16-498
ENGINE SPEED	RPM	750	750
ENGINE LOAD	BHP	1600	2800
B.M.E.P.	PSI	83.6	146
FUEL CONSUMPTION	#BHP-HR	400	.374
EXHAUST TEMPERATURE	°F.	615	740
FIRING PRESSURE	PSI	1050	1335
COMPRESSION PRESSURE	PSI	600	730 (12 PSI AIR BOX PRESSURE
COMPRESSION RATIO		15.6	13.2
AIR PRESSURE			
COMPRESSOR DISCHARGE	PSI	—	15.0
AIR BOX PRESSURE	PSI	3.7	14.5
AIR BOX TEMPERATURE	°F	150	120
EXHAUST PRESSURE			
TO TURBINE	PSI	—	11.5
TO STACK	PSI	1.5	.25
AIR FLOW- FREE AIR	CFM	5730	9800
AIR FUEL RATIO (BASED ON TOTAL AIR)		38/1	40/1
TEST HOURS	HRS		1440 (TOTAL) 1150 (ABOVE 1600 BHP) 880 (ABOVE 2800 BHP)

Performance Comparison.

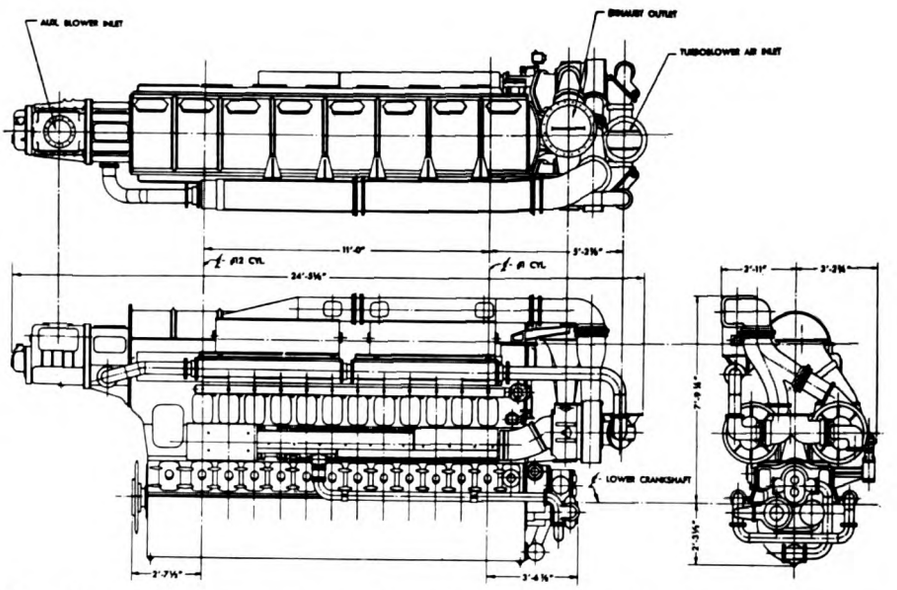
friction power. There is said to be little change in exhaust temperature with an increase in engine speed.

Fairbanks, Morse & Company

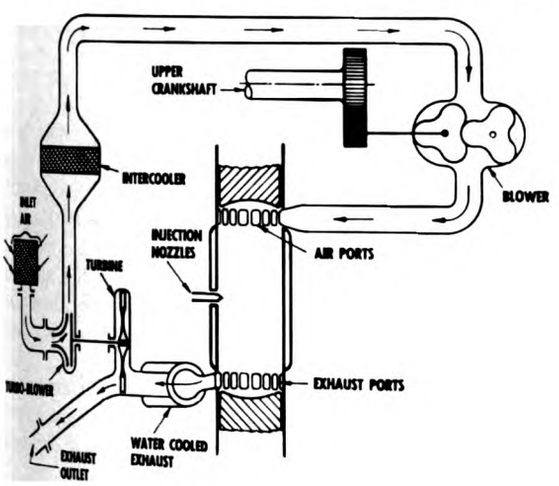
In 1952, with the availability of a highly efficient turbocharger, it became apparent to this company that a production supercharged, two-cycle diesel engine was in order. This unit was developed with two things in mind; to increase the engine rating and substantially reduce fuel consumption. As others had come to realize, the pulse system resulted in the most efficient engine and turbocharger combination.

With over eighteen years experience in producing opposed piston, two-cycle engines for locomotives behind them, this company thought it best to develop the supercharged versions from this basic design. The simplest application of supercharging was selected for the early tests. The engine remained unchanged except for minor modifications to accept the turbocharger which delivered the scavenging air to the existing engine-driven blower. The built-in exhaust manifolds remained water-cooled.

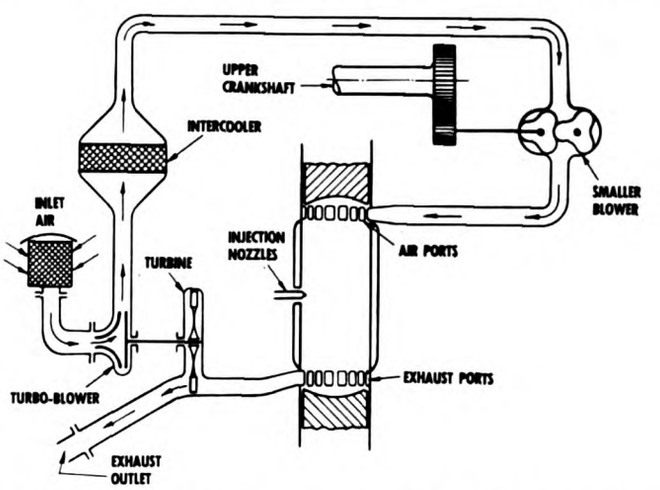
The results of the initial tests were gratifying inasmuch as the



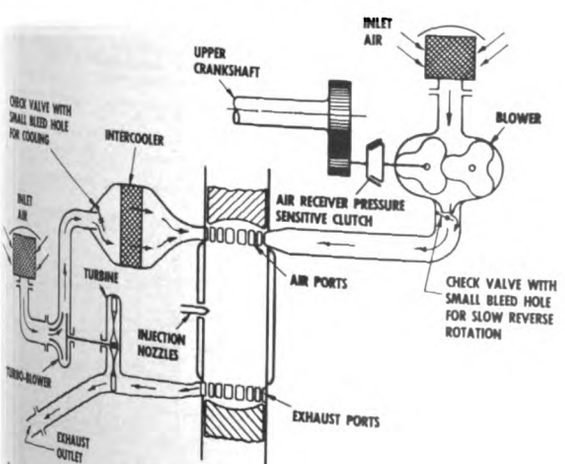
General arrangement drawing of the Fairbanks-Morse supercharged, 12 cylinder, opposed piston diesel.



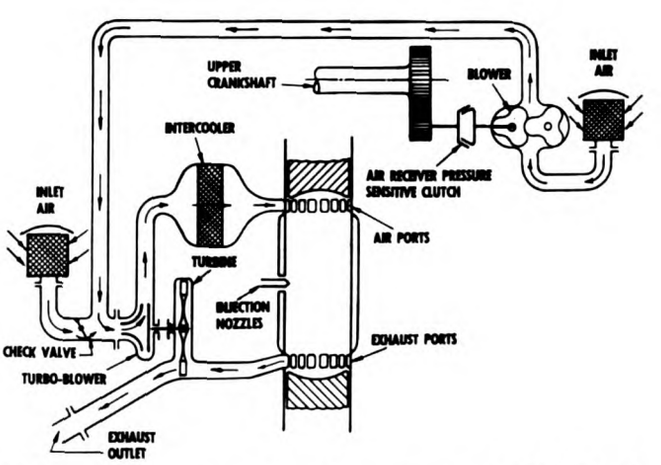
A diagram of an early supercharging experiment.



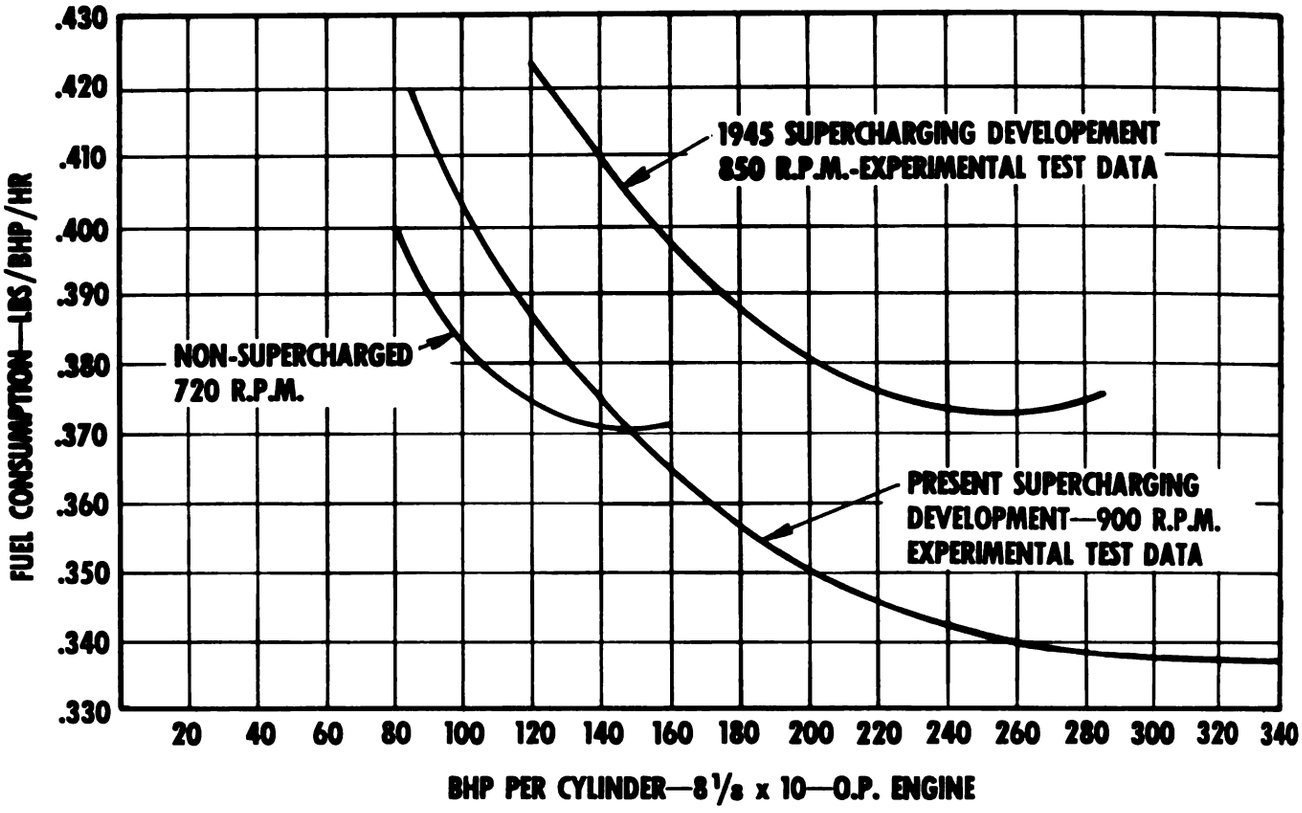
An improved series blower arrangement with a calibrated positive blower and a non-cooled exhaust manifold.



An auxiliary positive blower setup for light load operations.



The present auxiliary positive blower arrangement. Discharge is into the turbo-blower inlet.



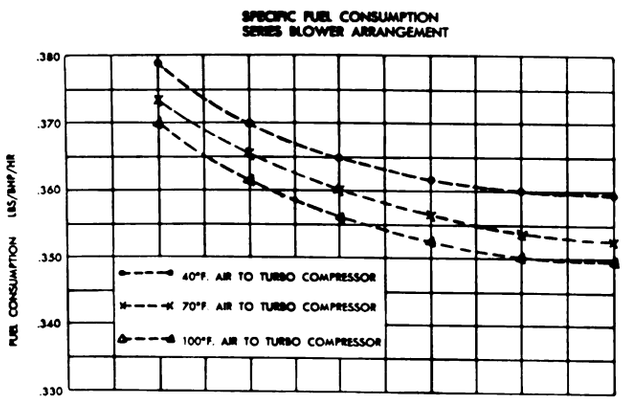
overall turbocharger efficiency reached about 49% and the firing pressures remained under 1,500 psi. On the other hand, it was interesting to note that a full load produced a darker exhaust and an excessive amount of wear was experienced on piston rings, cylinder liners, and piston pin bushings. These findings were brightened by the improvement in fuel consumption which indicated even greater promise in further development.

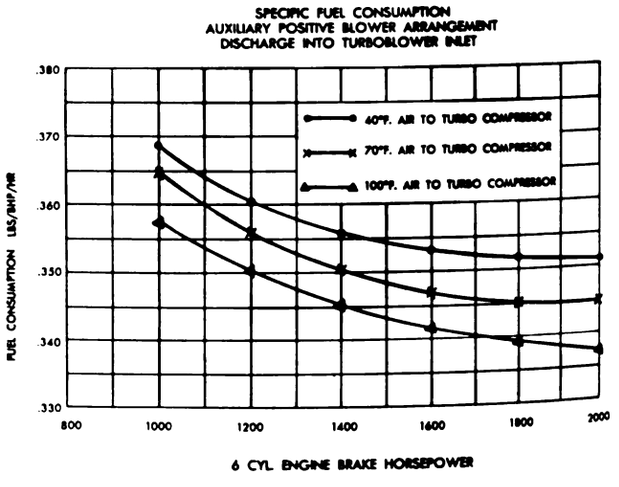
Experimentation to date has covered four different stages of supercharger designs. Beginning with an arrangement of water-cooled exhaust manifolds common to all cylinders tied into the existing engine-driven blower in series with a turbocharger, the next design was identical except that a non cooled, pulse-type exhaust manifold was introduced. It was possible with this plan to have the engine-driven blower do very little or no work at three-quarter to full load.

The next and third stage was a refinement of second. The blower was purposely made small and was called upon only during starting and light load conditions. With this system a critical point of pulsation was observed which appeared the moment the turbocharger overcame the blower pressure. It also established that intercooling was necessary to the air entering the blower.

The fourth design differs from the third only in the method of air delivery. Instead of going directly to the air receiver, the auxiliary air supply is delivered to the turbo intake. In this manner the auxiliary blower air aids in starting the turbocharger and in addition must pass through an intercooler.

Nearly three years of experimentation has produced a suprcharged, opposed piston, two-cycle diesel engine that is self sustaining over the entire load range, including starting. Production-wise, general arrangement of turbochargers has been





worked out with resulting simplicity. Six, eight, ten and twelve inch diameter cylinders will use basically the same turbo charger. The six and eight inch sizes will use a single unit and the ten and twelve inchers will carry two units.

Fairbanks-Morse management express the belief that the supercharging of two-cycle, opposed piston engines can be achieved with production simplicity and operational dependability equal to or exceeding the four-cycle engine. Performance figures on this latest model bear out their optimism in predicting inherently greater fuel economy. (Test results indicated a 0.333 lb/hphr possibilty for this medium speed engine.) It is further reported that there is no serious performance sacrifice to gain the increased engine output; as previously mentioned, sudden load variations between one-half and full load are handled without the aid of auxiliary blower equipment as well as starting and minor sudden load changes.

The reader is referred to the photograph of the Napier's "Deltic" engine. This is offered as an interesting solution to the question of supercharging the two-cycle engine.

Briefly, two of these Deltic engines are combined with an electric transmission resulting in a 3,400 hp locomotive having an axle load under 19 tons. Total weight of this English Electric Company locomotive is about 240,000 lb, or 71 lb/hp. This is believed by the builders to be the lightest weight ever attained.

The Napier Deltic engine, which features opposed-piston cylinders arranged in the form of a triangle, was selected because of the belief that this design overcomes most of the technical objections to the opposed-piston layout. Furthermore, the space between the cylinders provides room for an axial-flow compressor. The resulting assembly is a compact engine reported to weigh only about 2½ lb/Bhp for an output of 5,500 bhp. The accompanying photograph clearly illustrates this principle.

The decision to adapt this type of opposed piston, supercharged engine to this particular railroad application was based on these conclusions:

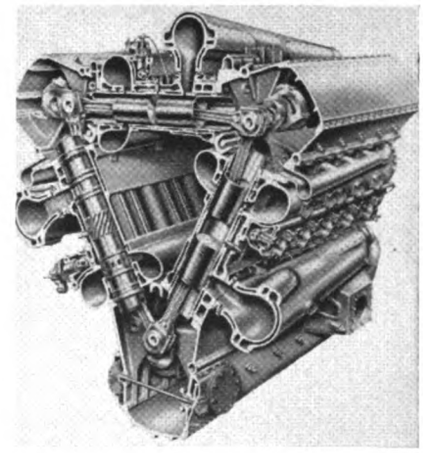
(1) In spite of its economy in the use of air, the four-cycle engine cannot compete on a Bhp basis per cubic inch of cylinder with the two-cycle engine.

(2) Because of its small piston diameter in relation to the cylinder volume, the opposed-piston cylinder is capable of producing a far greater output at a given piston temperature than other types.

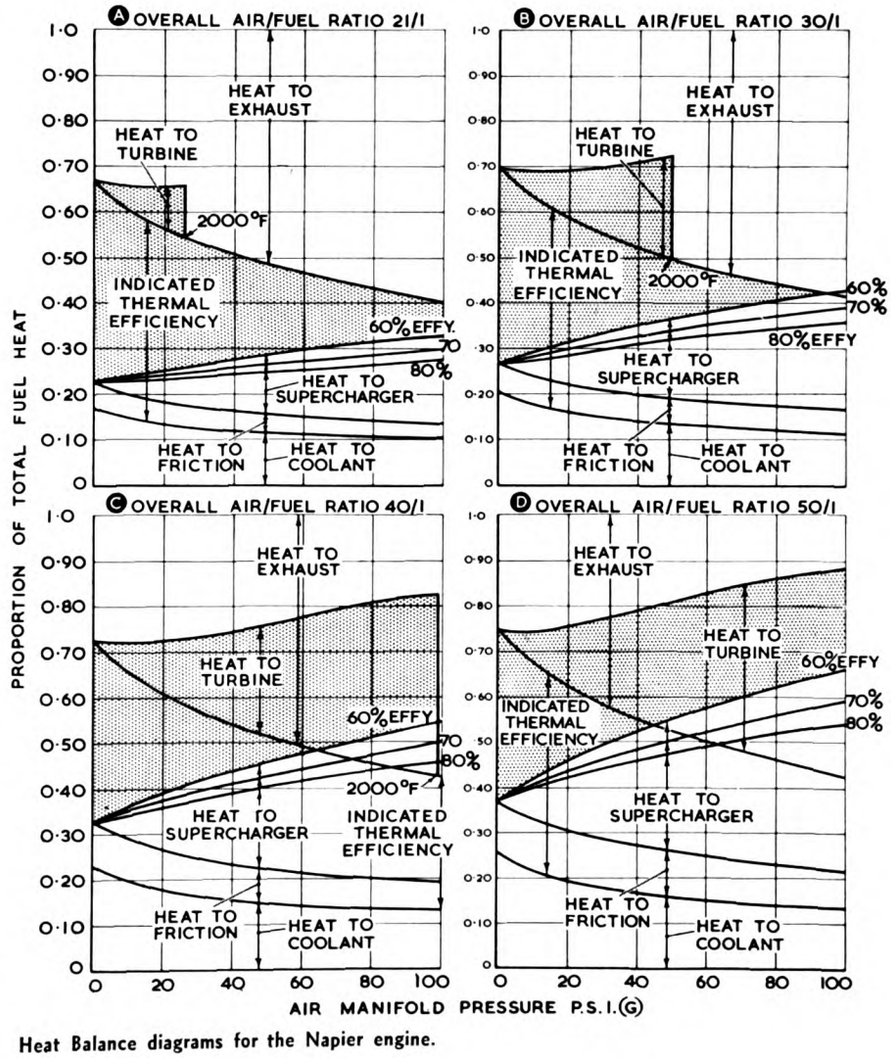
(3) High degrees of supercharging exert considerable influence on the final power output. For these high manifold pressures, an axial-flow supercharger is regarded essential.

(4) Since the turbine furnishes more power than can be absorbed by the supercharger, it must be geared back into the engine output, forming a "compound" engine. The increased power resulting from increased supercharging and air/fuel ratio can be obtained with very little sacrifice in fuel consumption.

To sum up the facts presented, with some supercharged, two-cycle diesel engines already in production and others about ready for release, it is reasonable that this form of motive power be given serious study. All of the effort and success warrants this consideration.

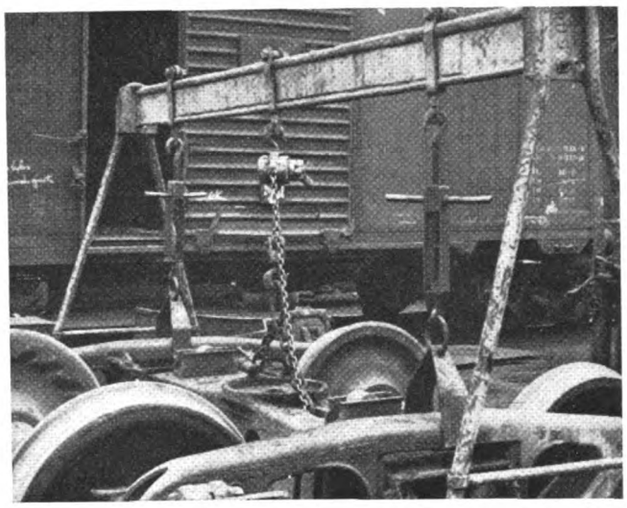


The Napier "Deltic" engine, which employs opposed pistons in a triangular arrangement. This design is said to lend itself readily to the axial flow compressor described.

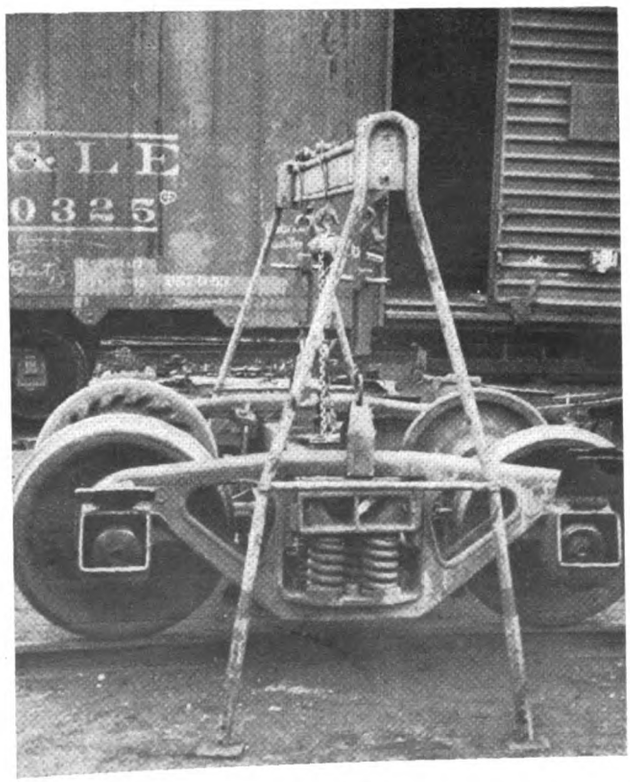


Heat Balance diagrams for the Napier engine.

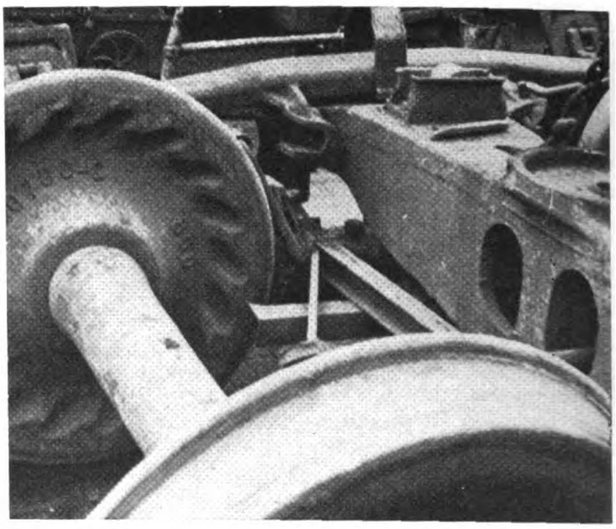
How P&LE Tears Down Freight-Car Trucks



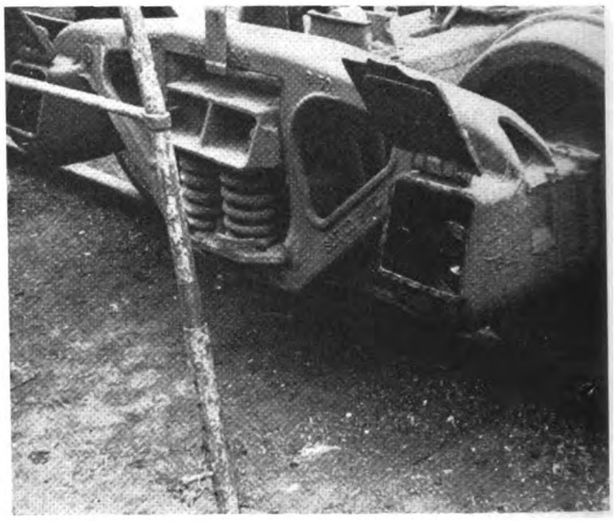
1. The Pittsburgh & Lake Erie has constructed several of these lightweight frames to simplify the disassembly of freight-car trucks. The hoists, mounted on rollers so they can be easily moved along the top rail, permit individual lifting of the bolster or either side frame.



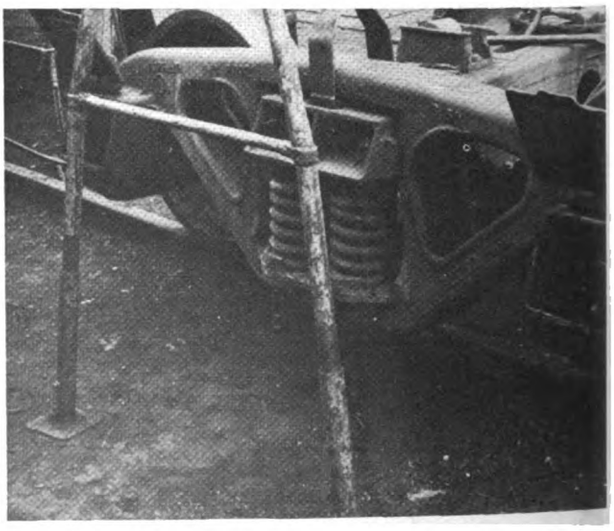
2. The frame can be moved easily to any car undergoing repairs.



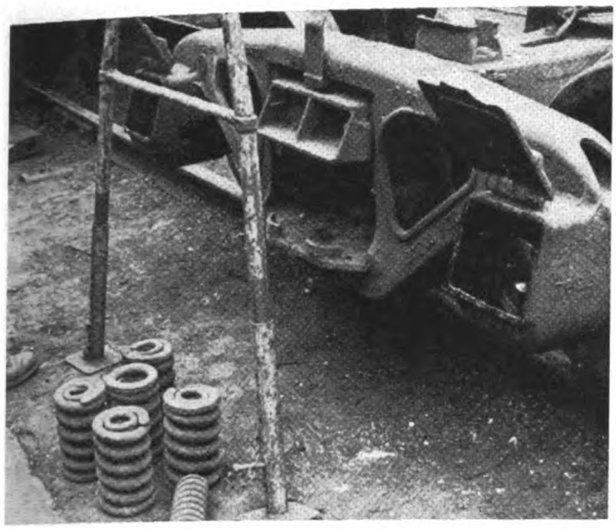
3. The first step in truck disassembly is freeing the brake beam hangers.



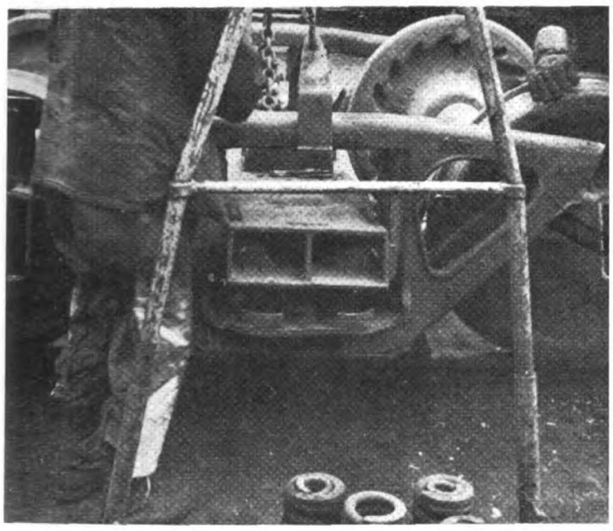
4. Turnbuckle raises the side frame to allow removal of bearings and wedges.



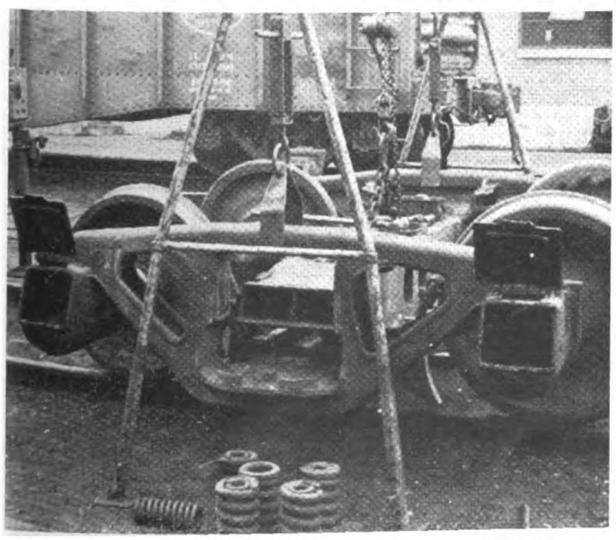
5. Central racket hoist then raises the bolster to unload the springs.



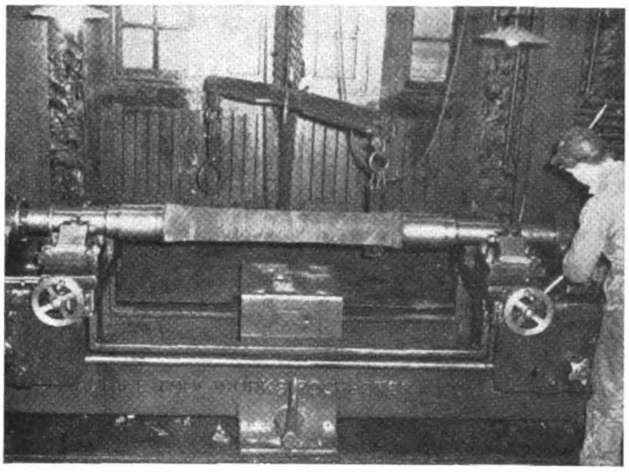
6. Springs are removed so that the bolster can be lowered out of columns.



7. The bolster is then lowered out of column guides to free the side frame.



8. The side frame is rolled away from the bolster and the disassembly is complete.



Converted burnishing machine.

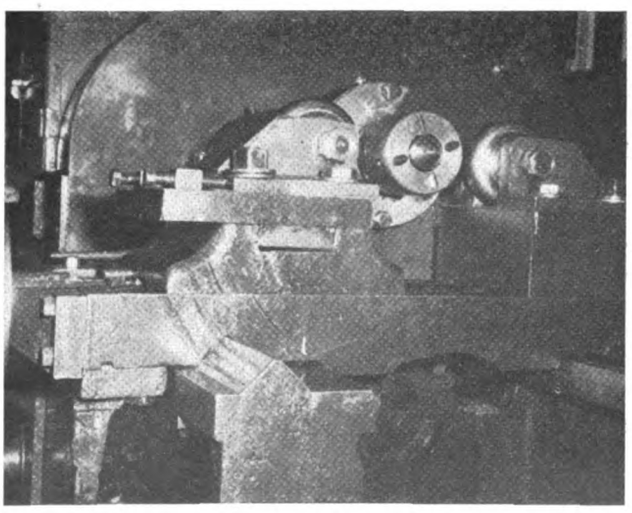
Burnishing Machine Has Spring Loaded Friction Drive

A high-speed burnisher turning out 24 axles per 8-hr shift made from a center-drive axle lathe. The converted burnishing machine is belt driven throughout except for the feed shaft, which is gear-driven.

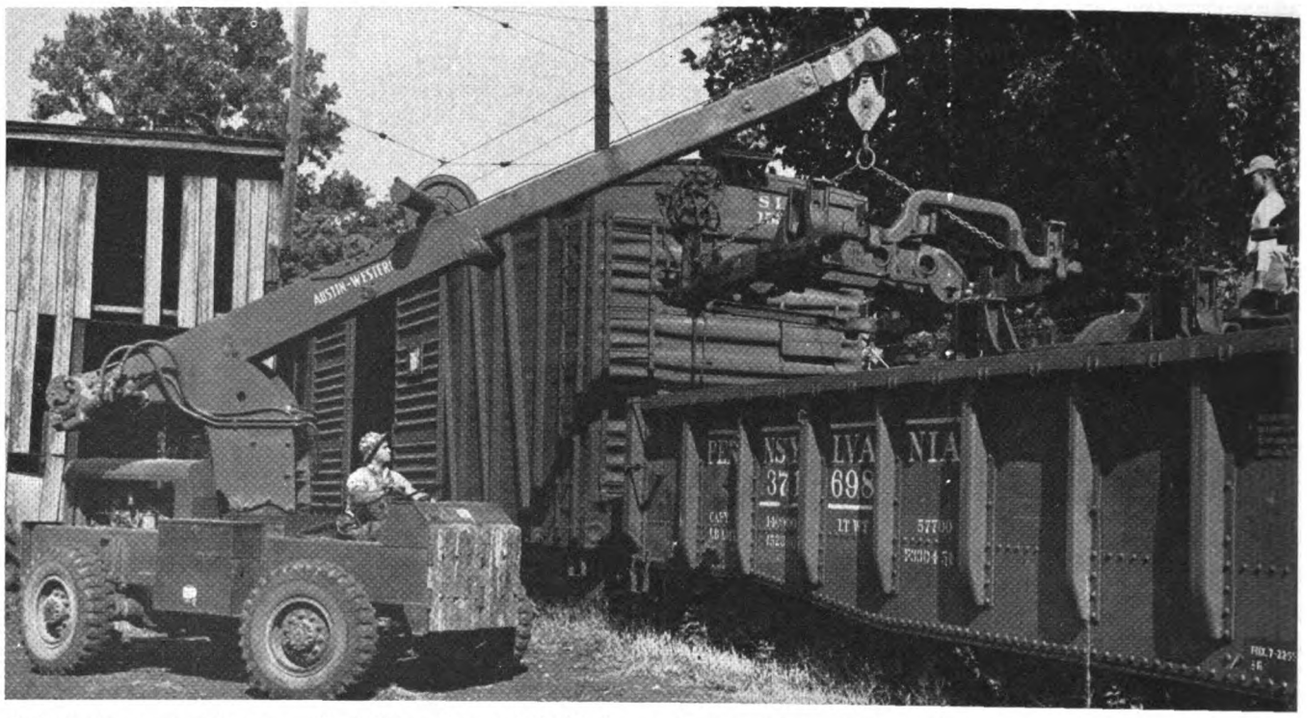
Burnishing is done at 215 rpm with a feed of .020 in. per revolution. The rollers are stellite and the driving motor is 15 hp.

The axle is quickly loaded and positioned for burnishing through a spring-loaded live center and friction drive. The housing for this threads in and out to adjust for minor differences in axle lengths. The four drive jaws are made of tool steel shaped to a moderately sharp edge for gripping the axle to revolve it.

A jack is to be applied to the block in the center of the machine to reduce loading time to a minimum by lining up the axle to the two centers without hand guidance.

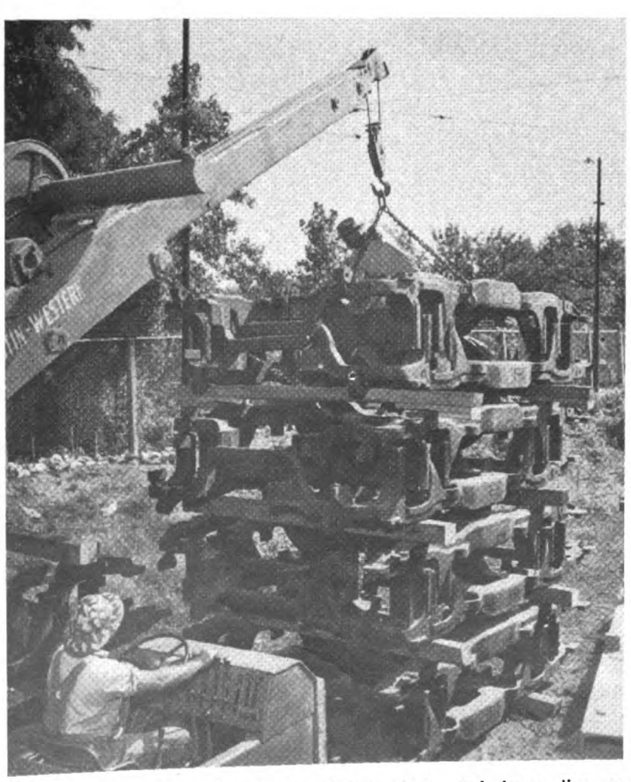


The spring loaded line center and friction drive.



Hydraulically operated boom on this vehicle swings a full 360 deg, making it easier to unload truck frames, wheels and flooring from gondolas.

Simplifying Handling and Storage of Heavy Car Parts



The crane also permits storing heavy parts and large jigs on blocks or pallets instead of on concreted areas or on flat cars as had to be done with previous unloading methods.

A novel type vehicle with an integral crane, originally developed during the war for torpedo loading, has been found quite handy at an industrial plant for a number of operations similar to those performed regularly at railroad car repair points.

The vehicle used is an Austin-Western 5-ton hydraulic crane. The boom can swing in a full circle, and both front and rear wheels steer for maximum maneuverability. Controls are such that the boom can be raised, extended and swung at the same time. For loads up to about 3 tons at full extension of the boom, or full 5-ton loads at partial extension, the wheels are mounted one way on the axle. This gives minimum distance between them. For full loads at full extension of the boom, the wheels are reversed on the axle to increase the transverse wheel base 8 in.

The car is used mainly as a yard crane. It can tow or push. Maximum speed is 20 to 25 mph.

In addition to making the loading operations easier by its ability to reach into a storage shed or the end of an end-loading box car, the crane also permits the use of simpler storage facilities. Where concrete platforms or flat cars were formerly needed for storing heavy parts, now all that is needed is to throw down some cinders and ties and store the parts on the ties. This has also eliminated the problem of cracked concrete from the heavy loads.

The First in a New Service Series
To Run Every Other Month

Roll Them Out Like New

"Roll Them Out Like New" is the title being given to a series of articles on diesel electric locomotive shop practice which begins in this issue. Like the "Keep 'Em Rolling" series, which was so popular, the subject will be presented in "words of one syllable".

The new series will have to do with the "hospitalization" type of treatment rather than "doctor's office call" type described in "Keep 'Em Rolling." It will follow through backshop procedure, detailing the work required and describing methods of work and testing which are most effective. It will explain why the various jobs are done.

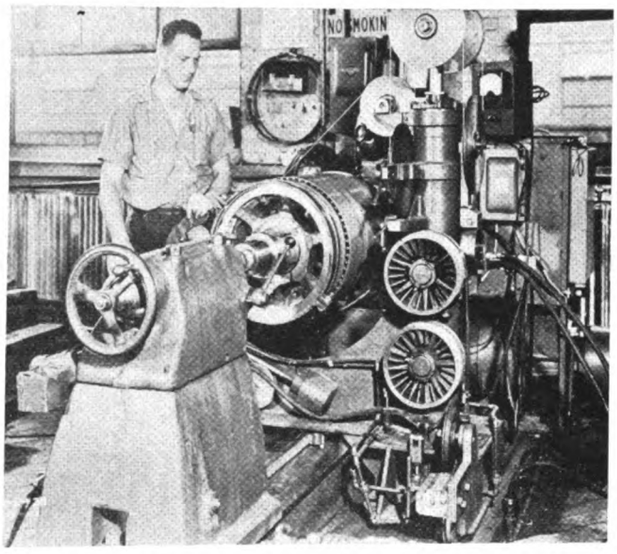
Also, the series will have direct bearing upon the relative desirability of railroad versus manufacturer's shop repairing and with the questions of rebuilding, remanufacture and the economic life of a locomotive.

- **The articles will run every second month.**
- **Be sure you do not miss any.**
- **They will be worth saving.**

By J. W. Teker, Locomotive & Car Equipment Dept., General Electric Co., Erie, Pa.

1 There Are Two Kinds Of Maintenance

There are two kinds of maintenance. Sooner or later stress and wear take their toll. This is true for every kind of machine man makes—even for the wonderful mechanism of the human body. Unlike the body, however, machinery does not repair itself. Man must correct the wear and tear on the machines he builds. Locomotives are no exception to this rule. Fuel and air must be supplied to the engines. Parts must be cooled and lubricated. Dust and dirt must be cleared away, and adjustments must be made to take up wear. This is the kind of service that is needed to keep locomotives rolling. It is running maintenance—like giving your



Repair of electric equipment often requires special machines and tools.

Exacting measurements are part of a fully equipped repair shop.

body the food, air and everyday needs to keep in good shape. Running maintenance includes periodic checks to insure that the equipment is in good operating condition. These are like regular physical check-ups on the state of your health.

For every machine the time comes when a different kind of maintenance is required. All the adjustable wear may be used up; parts may have been weakened to the breaking point; or an accident may have smashed the machine. This is where the repair shop comes in. The locomotive goes to the railroad shop or the manufacturer for overhaul. This is like going to the hospital for surgery to put your body back into first class shape.

There's a Difference

Running maintenance and overhaul are both vital to locomotive operation. Both have the same purpose—keeping locomotives on the job. Yet they are very different. Running maintenance aims at having motive power ready to go when needed and keeping it rolling. To do this, troubles are quickly located and corrected on the spot. If necessary, defective equipment is replaced so the locomotive can go when called. Except for this and making adjustments for wear, there just isn't time or place for elaborate repairs. Fuel, water, oil and sand are put aboard. The locomotive is washed and the interior mopped up. Necessary inspection forms are signed and the locomotive is hustled out for another run.

The work of the repair shop is very different. Here it is not a question of a quick turn around to make another trip. The job now is to put the equipment into shape to make hundreds of trips. Weakened and worn parts are rebuilt to restore the margin needed for running adjustments. Inspection and test decide whether parts are fit to operate for another long period without failing. To do this, heavy and complex equipment must be torn down to reach the innermost parts. Such work requires time, special tools and various skills. Exacting measurements must be made and special operations performed. At times even laboratory techniques are used.

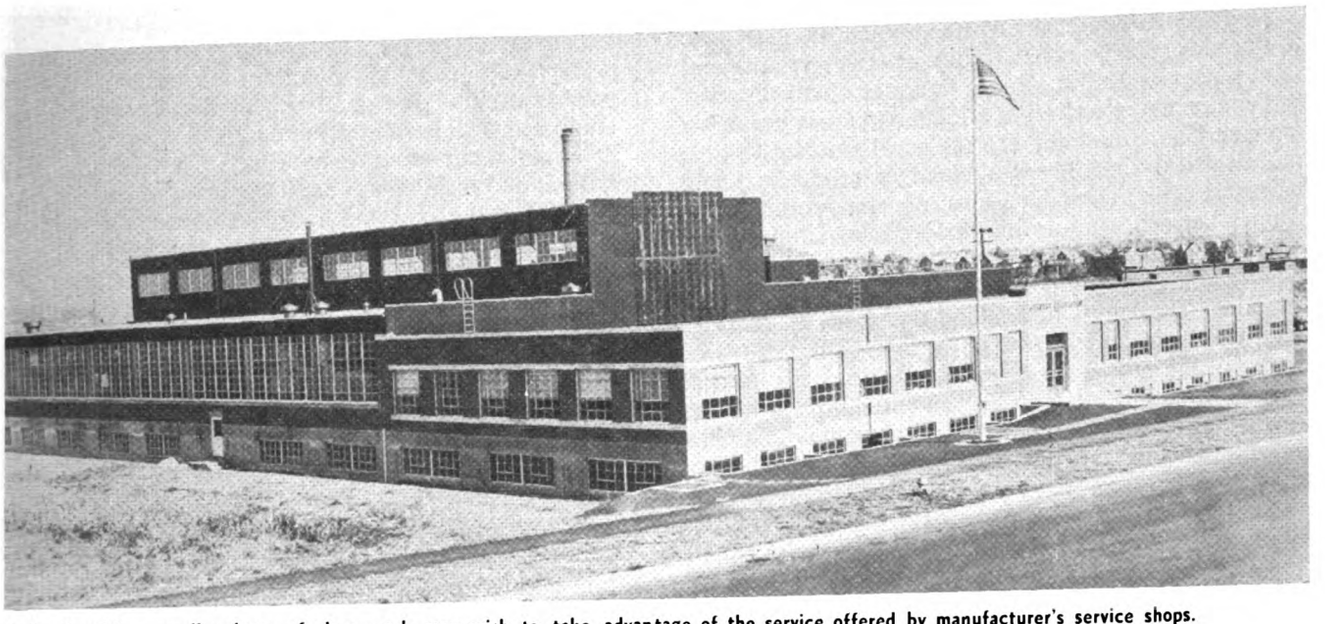
The whole attitude of the repair shop is more deliberate. Actions taken here have far reaching effects. Results are not judged by a single trip; but by one, two, or even three years of trips. This kind of work would be entirely out of place in a running maintenance organization. In fact, it would only interfere with the fast, efficient, smooth operation of such a group. Therefore, it is profitable to keep these two kinds of maintenance separate. The overhaul shop should be completely removed from running maintenance facilities. As a general rule, even the same men should not work at both types of jobs. The two take different paces, skills and temperments. A good running maintenance man is familiar with the over-all operation of a locomotive. He knows how one piece of equipment is related to another. He is not so much concerned with details of the inside parts and devices as is the shop man. A good shop man is more likely to be a specialist. He builds up his skill to meet the demands of one exacting job and confines his attention to that.

Another thing—it is hard to find a man that is expert at all jobs. Imagine a man who can sledge up a steam engine piston rod to a crosshead, then climb into a diesel cab and adjust a governor or transmission relay, and finally walk over to a bench and finish winding an armature! This doesn't mean it can't be done—but is it good practice? Bringing too many kinds of jobs under one roof is bound to result in confusion and conflict. To a running maintenance man, the rhythmic throb of a diesel engine is sweet music. To a shop man, it just represents so much noise, smoke and dirt that he doesn't want around when he is making a precise measurement or closing a freshly lubricated bearing.

We Need Both

Both kinds of maintenance are needed in railroad operation. Each is important in its rightful place. How well each job is done has a big influence on how long a locomotive stays in service.

Every railroad, even though it may own only one locomotive, must provide for running maintenance. But,



Railroads with a small volume of shop work may wish to take advantage of the service offered by manufacturer's service shops.

must it also have a repair shop? That question is not always easy to answer. Only careful investigation and serious study will show whether it is a costly luxury or a profitable investment.

One thing is certain, sooner or later every locomotive needs the services of a repair shop. It gets worn and needs to have its youth renewed. But such a shop is not a fountain of youth bubbling up free for the asking. It represents a sizeable investment in facilities and personnel. It is an exacting taskmaster, demanding the best of industrial know-how and management to make it pay. It requires constant effort to keep up with the latest methods and processes in order to stay on top of the job. It must strike the economic balance between cost of repairs and cost of road failures. Mistakes one way or the other can foul things up badly. They can make the difference between a shop that efficiently meets the need, and one that is a white elephant with enough troubles to eat the railroad out of business.

Regardless of how large or small a railroad may be, some kind of shop must be considered. How large and how well equipped should it be? How much work should be attempted, and how far should it be carried? When should the locomotive builders shop be used?

To answer these questions, let's go back to our first comparison. A shop is like a hospital. Every community, no matter how small, needs a hospital. Yet many cannot afford to have a completely staffed and equipped hospital— they just don't need it often enough. They must send their serious cases to a larger community that is able to support that kind of hospital. In the same way, volume of work is a very important factor in deciding the kind of a repair shop. It takes a good lot of business to justify the large investment and skilled payroll of a fully equipped shop. This is not throwing cold water on the idea of a shop. It is simply viewing the question in a way that makes good sense. So, look before you leap. It is expensive to turn back once an ill-advised investment is made in a shop. Discuss your problem with others who have had experience. Try to find out what the break-even point is for your operation. Valuable information on this subject is contained in the reports of AAR Committee Section 12 on Repair Shops, Electrical Section of the Engineering and Mechanical Divisions. This Committee has prepared a comprehensive outline of the items that should be considered before embarking on a shop modernization or capital improvement program. This is so complex as to almost require individual study for each particular shop.

How Little or How Much?

Let's see how the principles just stated might fit into any situation. Overhauling and rebuilding of the variety of machinery which makes up the diesel-electric locomotive requires special tools and men having many different skills. These men can do the best job when they have the best equipment, just as the skilled surgeon can operate best in a fully equipped hospital.

Some of the skills and tools have been passed on from the days of the steam locomotive. With proper changes they can be adapted to the new job. A good example is locomotive trucks, wheels and axles. The air brake system is another case. Steam and air piping, couplers and draft gear, and signal systems are some more that are already familiar to any railroad shop.

The diesel engine, radiator cooling system and air brake compressor are new. Although they make more exacting demands on the machinists' skill, they are still mechanical in nature. You can see what is needed and visualize how the parts work together. New standards of precise work, accurate measurement and cleanliness are required. For some mechanics this may mean self-discipline and self-development. The man whose heart is in the work will take it, once he knows what the job demands and the opportunities it holds.

The newest and least familiar addition to the shop program is the electric equipment. There is the control apparatus, the maze of wires and cables, and the motors and generators. A host of special tools, machinery and testing equipment has evolved from this type of motive power. The little corner of the old steam shop allotted to the electrician would be more than swamped today.

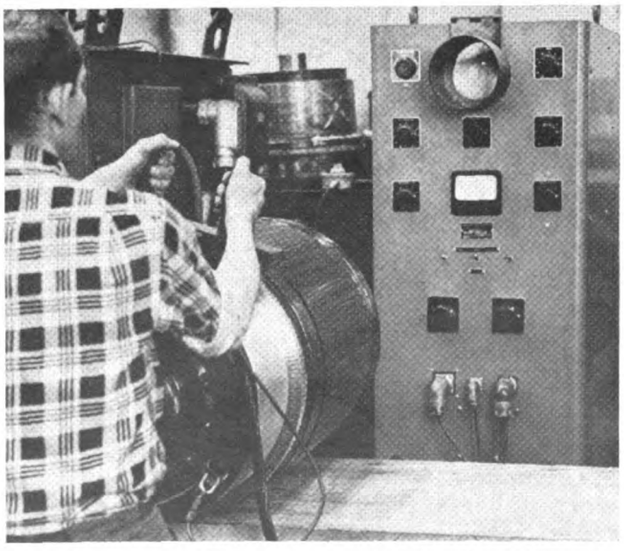
This special equipment is no problem in itself—all you need is enough money to buy what you require and shop space to install it. But to find men qualified to use this equipment effectively is a matter which is becoming more serious. In addition to the usual machinist skills, the electrical shop needs a blend of mechanical and electrical skills. These men must understand things that cannot be seen, such as the flow of electricity and the effect of magnetic fields. They must know how iron, copper and insulation work together in an electric machine. They must understand the needs of bearings and the balancing of rotating parts. They must be aware of the proper use of snug and shrink fits in combining these materials. They should know processes involving special-purpose equipment, such as soldering, brazing, binding, varnish treatment and seasoning of mica.

Shop work not only involves the sciences, but also draws upon the arts. Many operations are routine and predictable. Examples of this are measuring hardness of commutator segments, obtaining bar-to-bar resistance of armature windings, and determining the viscosity of varnish. Other operations depend upon skill, feel and judgment acquired only by training and experience. One instance is the placing of coils in armature slots without damage; another is feeling the roughness of a spinning commutator and knowing what to do to improve it. You just cannot take men off the street for such jobs. They must stay with the work long enough to acquire such abilities. They are the surgeons of the motive power department. Like any good surgeon, their skill must be developed by study and practice. Also, they must keep posted on new processes and improvements so that the equipment they overhaul will be a credit to them and to the shop. Jobs like this are a challenge to the highest type of workmen—men who take pride in their achievements.

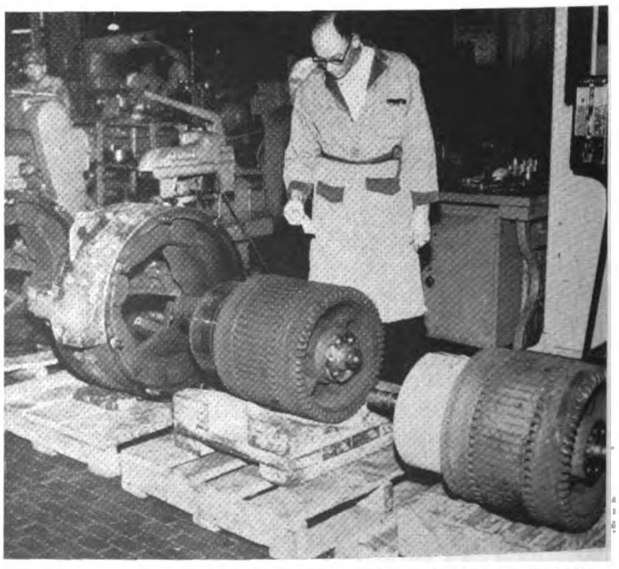
The overhaul of electric equipment is not a screwdriver-and-monkey-wrench job. It requires proper tools and equipment, and a high degree of know-how and skill. Unqualified men and poorly equipped shops should never attempt it. Harm can be done faster than it can be corrected. Little things that seem unimportant can make an awful lot of trouble. Defects painted over to give good appearance; insulation contaminated by improper cleaning; or bearings assembled incorrectly can prove very deadly. The resulting road failures and train delays are a big price to pay for such work. Certainly it would have been much wiser to have the job done by trained personnel. As a matter of fact, the most economical plan in many such situations is to take advantage of the manufacturer's repair shop service. This insures the use of factory parts, expert workmanship, and a top quality product. Also, it saves the user carrying the burden of shop investment and operation. Small railroads that do not have enough overhaul business to justify a fully equipped shop and a staff of trained men, will find this solution of their problem almost ideal.

A different situation arises where there is considerable overhaul work. While this justifies a shop, it may prove economical to draw the line at some labor skill or amount of investment. Difficulty in obtaining and training men in certain skills, or the amount of investment required for equipment and facilities may set the limit. In such cases all the mechanical work will most likely be done by the railroad. This includes work on the running gear, air brakes and steam system. Existing steam facilities can be changed over at a reasonable cost to take care of this work. The mechanic skills may also fit into this plan with a moderate amount of training. The addition of a shop for major overhaul of engines, motors and generators is another matter. This may be too much for the budget to stand. The cost of specialized tools and machinery for this work is high. Skilled workmen are probably not available, and a training program involves more money and time. A good solution is to send this major rebuild work to a dependable, qualified service shop, or to the original manufacturer.

The next step toward a complete shop is the railroad doing all the electrical cleaning and overhaul work. Only complete rewinds, rebuilds and wrecks are sent to the manufacturer. This may work some economy.



Shop man must understand invisible things, such as flow of electricity.



Proper storage and care of electrical parts is of prime importance.

However, it involves the responsibility of deciding which equipment to clean and which to send out for repair. Someone must be competent to judge the condition of equipment when it is received. For example, he must check the tightness of the armature bands and wedges, the condition of the commutator, and the insulation. This course involves an outlay for handling, cleaning and specialized testing equipment. Also, qualified men must be recruited or trained to do the work.

The final step is for the railroad to have a fully equipped shop and all that goes with it. Even then it may be desirable to draw the line at a work load that will permit maximum operating efficiency. Any work above this limit is sent to the manufacturer's shop. Every shop experiences wide swings in the work load. These may be the result of seasonal changes, unexpected emergencies, wrecks, floods, etc. By farming out the extra work, the railroad shop force can be held at the usual level and assured steady work. This is a big help in keeping good men on the job. Also, the investment in tools, machinery and facilities can be fixed at a reasonable level. Otherwise it would have to be high enough to take care of the emergency peaks. The builder's shop can be used like a flywheel to steady the ups and downs of the railroad shop load. This scheme often results in a smoother, more economical operation. Here is a potential benefit that justifies careful study by alert shop management.

Write It Down

Regardless of how much or little shop work you do, good records are important. We all like to know what we are doing, and a well-run railroad shop is no exception. That is where a good record system comes into the picture. It enables you to keep track of what was done and what the results were. This is specially important in shops where a large number of motors, generators and auxiliaries must be overhauled or rebuilt. It is particularly important when you want to get information on results from using new materials or processes. Don't trust your memory. You may be able to recall what was done a week or even a month ago. But most equipment doesn't return to the shop for a year or more. By then it will be impossible to recall what was done and to which equipment. Then the "little black book" that a careful workman keeps in his pocket comes in mighty handy. But you can't depend on the chance that some workman made a record of what you may want to know a year or two later. The only safe thing is to have a system for keeping such information. Remember, the shop is the locomotive hospital, and a hospital is careful about checking all patients in and out. Their record of your condition and course of treatment may mean your life. In the same way accurate shop records can be helpful in obtaining long equipment life.

Records prove invaluable in the analysis of troubles and the study of costs. They are also a means for improving operation. As an example, take the screening and inspection of incoming jobs. If repeated entries are found which show evidence of abuses and bad practices in running maintenance, corrective action can be taken. Repeated signs of overheating may point to defective blowers, or broken or blocked air connections. The trail may even lead to defective relays failing to make backward transition when pulling up heavy grades. Another case might be persistent records of powdered mica under the bands and armature coils. This could result from faulty tension calibration on a binding lathe. It might also be caused by defective gearing. This, in turn, might be traced to bad gear case lubrication during running maintenance. Finding and correcting such troubles pays off in longer equipment life and fewer road delays.

Good Housekeeping

In addition to records, good planning and organization are vital to an efficient operation. They smooth the flow of work through the shop. The difference between a good and bad shop layout quickly shows up

A properly arranged, well kept shop promotes efficient, high grade work.

Accurate and complete records are a must for any well organized shop.

here. The location of machinery and work areas determines how smoothly jobs move from place to place, and the amount of handling required. A haphazard arrangement causes work to move in all directions and results in confusion, interference and delays.

Operations which are noisy, or which produce chips or dirt, should be separated from others. This may seem like a fine point, but it is important if you want to get the best out of a shop. It makes good housekeeping a lot easier and helps in concentration on specialized jobs. More and more, good housekeeping and attention to fine points are becoming the symbols of good organization.

The thorough cleaning of apparatus before it goes to the repair areas makes good housekeeping easier. Working on clean parts in well lighted, clean surroundings is good business. It promotes high standards of quality, gives the workman pride in his job, and calls forth his best efforts. A good man knows that he must keep his tools in first class shape if he is to do his best work. In the same way, a well-kept shop enables a man to do his best with the machinery and processes he uses on his job.

We all know how cleanliness and good housekeeping promote safety. Safety has always been an important consideration with railroads. This alone is an excellent reason for emphasizing the importance of good housekeeping.

Good housekeeping and records are well established practices in the stores departments of many railroads. These have been carried over from steam days, with necessary modifications for diesel-electric parts. As in the shop, the electric equipment is new here too. The care and attention given to the handling and storage of electrical materials has much to do with the success of the work in the shop. Conditions, such as temperature, humidity and location must be carefully watched when storing parts. For instance, mica parts stored on a top shelf might be useless when taken down. Why?—Temperatures near the roof in the summer time may be high enough to soften the binder, causing molded shapes to change and mica flakes to separate. Steam pipes can do the same kind of damage in the winter.

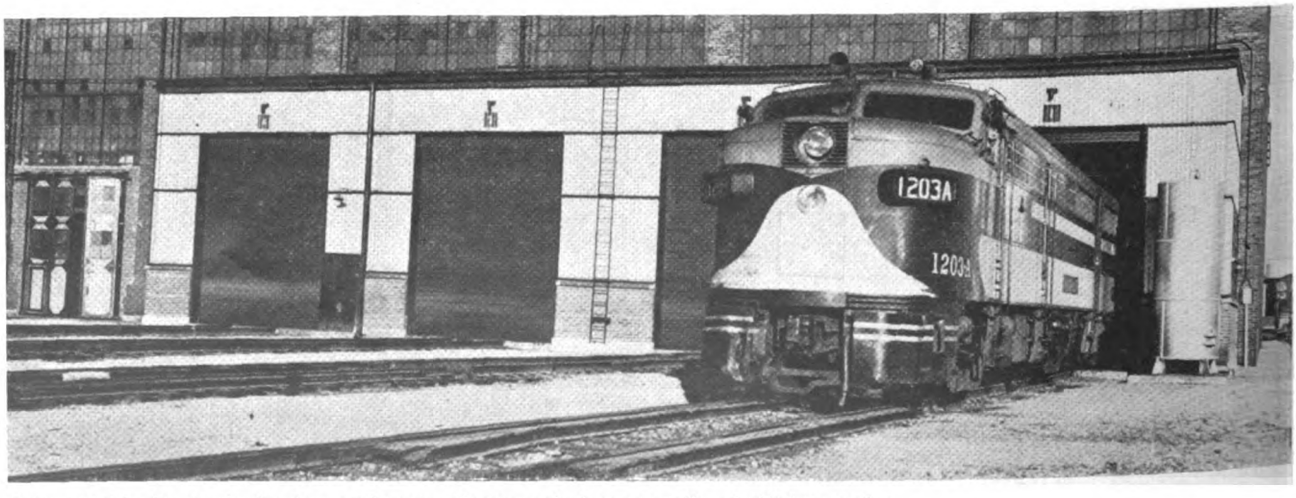
Humidity, or water from leaky walls or roofs may work slowly but surely on insulation. Coils, or even complete motors and generators, may be found unfit for use because of low insulation resistance. Time will have to be taken to bake and dry them out before they can be installed. In fact, equipment standing idle may suffer more than if it were in use because it doesn't have the benefit of heating in operation to keep it dry.

The location of parts is also very important. Electrical insulation is rather easily damaged if it is hit or scratched. Insulated parts should not be placed on the floor or in bins where they can be hit by passing hand trucks or by sweepers. Care should also be taken to prevent placing other material on such parts and thus damaging the insulation. Some kinds of electrical varnish will jellify if the container is stored in the direct heat of the sun. It is wise to check on the shelf life, proper storage and handling of new or unusual items when they first show up. You can expect these, because new materials are constantly being developed to meet the increasingly tougher requirements.

Keep Learning

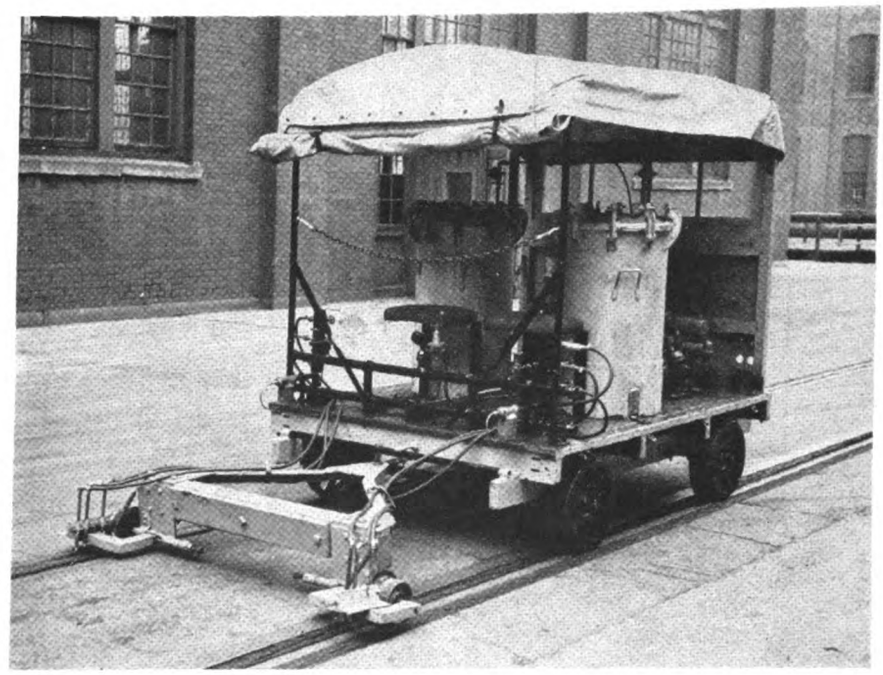
No matter what your job may be, get all the information you can. Keep learning new things about it and you will keep progressing. Read up on literature dealing with your subjects. Attend meetings of groups, such as diesel clubs, associations and technical societies dealing with these new areas and problems.

Above all, be sure to get the information to the men who should be using it. This is most important. How often do instruction books, bulletins and other vital information gather dust in an office far removed from the shop floor where they are needed? This also applies to modernization instructions. Many early equipments can now be brought up-to-date. Kits are available from the manufacturer for conversion of equipment to increase its performance. In many cases the job is quite easily done during overhaul or rebuild. By taking advantage of such opportunities damaged or worn equipment can be rebuilt to give increased performance. Equipment damaged or weakened, limps into the shop and rolls out like new. Yes, thanks to modernization, in many cases it is even better than new.



Rejuvenated by its stay in the shop, equipment rolls out ready for many miles of efficient service.

End view of the car showing the relationship of the application nozzles to the track. Maintenance of way car converted for rail conditioning showing pressure tanks, gasoline-driven compressor and trailing nozzle dolly.►



Reading Treats Slippery Rails

And increases average tonnages 17 per cent with an estimated net saving of 25 to 40 cents per train mile

MUCH DRIVER-TO-RAIL adhesion is lost when there is high moisture and a small amount of oil or grease on a rail. The moisture serves to spread the grease over the surface of the rail in a microscopically thin slippery layer which defies removal by the driver. This fact was discovered and reported on by R. K. Allen, General Electric Company, in the October 1954 issue of *Railway Locomotives and Cars*.

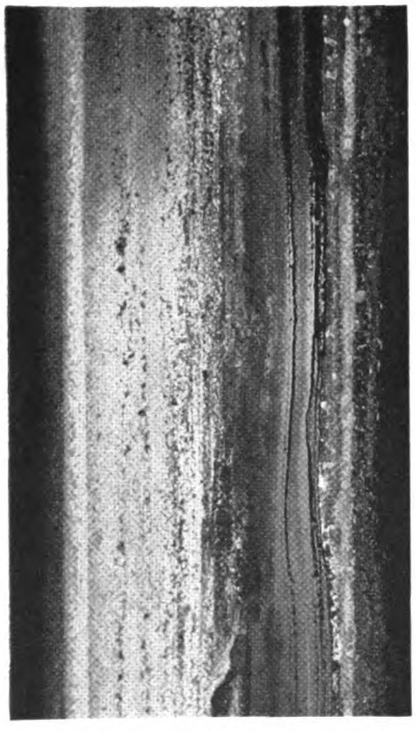
It was also learned that the offending film could be removed by washing. From 1953 to 1955, the General Electric Company and the Reading ran a large number of tests to determine a means of removing this oil film in a practical and efficient manner. Laboratory investigations indicated it might be possible to remove this oil film with a high-speed detergent. A railroad maintenance-of-way track car was equipped to wash the rail. The results were satisfactory in that on a tonnage train the number of wheel slips on the 35-mile grade could be reduced from the original range of 100 to 200 down to two or three with very thorough washing, and more importantly, thorough rinsing (*Railway Locomotives and Cars*, January, 1956). However, the cost per mile to wash and rinse the rail was prohibitive and indicated a need for some other means of eliminating or neutralizing the film.

Early in 1955, the National Aluminate Corp. (Nalco) requested permission to participate in these tests with chemicals of its manufacture which had shown considerable merit in laboratory tests. Through 1955 and a portion of 1956, joint research was established by the Reading, General Electric Company, and Nalco to progress tests on a type of chemical, now designated as Nalco RC rail conditioner, a sprayable liquid which overcomes lubricating properties of oil film.

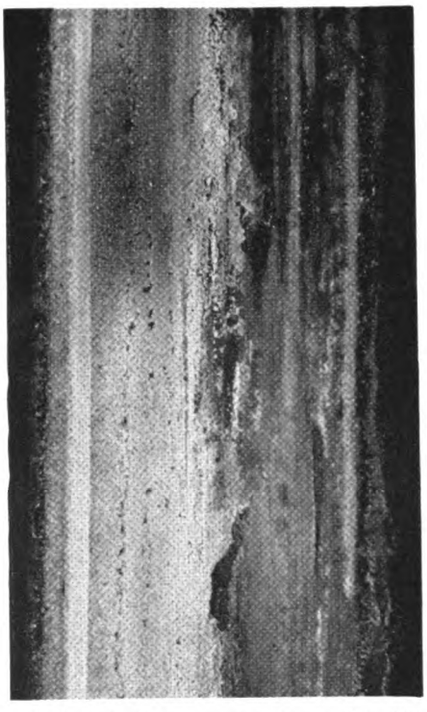
Several methods of applying Nalco RC were investigated. The reading has found that for its present operation the most practical method is to use a maintenance-of-way track car equipped to spray the rail.

The present rail-conditioning equipment consists of a maintenance-of-way track car equipped with two 30-gal galvanized tanks and a small compressor maintaining 40 lb pressure in the tanks. Nalco RC is sprayed on the rail at a car speed of 20 to 25 mph through a nozzle at an approximate rate of one quart per rail per mile, or ½ gal per mile of track.

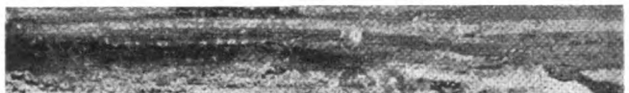
In June, 1956, encouraged by tests which indicated that operating adhesions could be raised substan-



Section of oil-contaminated rail tread before application of rail conditioner.



Section of the same rail tread after first train had passed over conditioned rail.



Section of the same rail tread after rail conditioner had been applied.

	Prior to Rail conditioning	With Rail conditioning
Units	Three 1,600-hp	Three 1,600-hp
Train	NJ-4	NJ-4
Weather	clear	rain
Tonnage	7,275	8,279
Running time on grade	2 hr, 45 min	3 hr, 28 min
Average mph	14.29	10.29
Average ampere demand	780	850
Average rail adhesion demand*	15 per cent	16.7 per cent
Maximum ampere demand	925	1,085
Maximum rail adhesion demand*	18.5 per cent	22.5 per cent

* Corrected for a wheel diameter of 37¾ in.

Remarks: Prior to rail conditioning—Constant wheel slipping for entire 35-mile grade. With rail conditioning—Occasional wheel slip primarily wheel walks. No loss of speed due to slipping.

tially with corresponding increase of tonnage, the Reading and Nalco arranged for a long-term evaluation under all operating conditions. The results have been good enough to justify incorporating the application as part of regular operating procedure.

The average tons per train handled on the Catawissa Branch, eastbound prior to rail conditioning, was 6,870 tons.

During the five month period (June through October, 1956) when rail conditioner was used, a substantial increase in adhesion permitted the average tonnages to be increased by approximately 17 per cent, thereby permitting greater utilization of motive power.

The table shows the performance of two selected trains, one of which was operated in clear weather prior to rail conditioning and the other in adverse weather with rail conditioning.

The Reading estimates that the average net savings vary from 25 to 40 cents per train mile, depending on the available tonnage to be moved eastward on the Catawissa Branch.

IMPREGNATOR FOR PAKISTAN.—One of the largest vacuum impregnating systems ever built will shortly be placed in service by the government of Pakistan Railways at Karachi. Supplied by the F. J. Stokes Corporation, Philadelphia, Pa., the equipment will be used to impregnate with insulating varnish the armatures and field coils of diesel-electric locomotive traction motors.

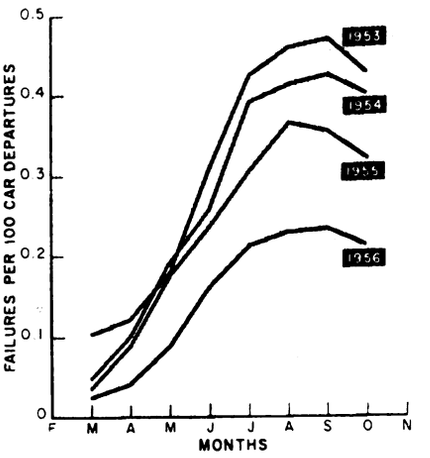
The tank at the left, the impregnating chamber, is 58 in. in inside diameter, 9 ft in height, with a maximum immersion height of 87 in. The varnish storage tank or reservoir at the right has a capacity of 1,120 gal.

Impregnation with the aid of vacuum insures deep and thorough penetration of the insulation varnish into the voids in the coil. After impregnation, the armature or the coil is removed from the vacuum chamber and the varnish is dried to maximum hardness by baking it slowly for 16 to 18 hours at a temperature of 140 to 150 deg C. The treated component then gets a further coat of red enamel Glyptal varnish by dipping it and then baking it another 12 to 18 hours at 120 to 150 deg D.

The vacuum impregnator is shown at the left and the varnish storage tank at the right.

Air Conditioning Failures Cut in Half

Instruction cars, improved equipment and good management combine to greatly improve Pullman service and reduce costs



THE PULLMAN COMPANY has made a major effort in recent years to improve the overall performance of its equipment. This is strikingly presented by the performance of air conditioning equipment on Pullman cars.

During the cooling season from March 1, 1953 through October 1953, there were 3,010 cooling failures, whereas during the same period of 1956, the failures had been reduced to 1,361. This reduction of 1,649 failures certainly means many more satisfied users of Rail-Pullman service with resultant goodwill.

Concentration on education of employes and setting up competition between the Pullman Company districts has been a basic part of the program to obtain better performance. The education feature is based on a Maintenance Manual consisting of concise instructions including pictures of detailed parts of the various systems. The Manual is in loose-leaf form, so the instructions can be implemented quickly as required. The Manual contains a "servicing procedure" which is the maintenance man's guide as to when each of the items of equipment must be inspected or tested at regular time intervals. It assures uniformity of instructions at all districts in the country. The instructions in the Manual are supplemented by on-the-ground training wherever trouble exists or a need is shown.

Reporting of failures in the early days of air conditioning was not too complete, so the reports have now been keyed to direct happenings on the particular car. A report on every failure is in the chief mechanical officer's hands within two days and a follow-up of the failure is automatically carried through to districts to which the car may be dispatched. This has resulted in practically eliminating cases of an individual car failing repeatedly without attention. For purposes of analysis, the causes of failure are immediately sent to those districts from which a car which failed was dispatched. In this way, those responsible are made aware of the cause of the defects. This puts in the hands of each district an up-to-date running record of all failure cars dispatched from their particular district.

For the cars maintained by the Pullman Company, a record is kept not only of the failures, but also of the departures so that each Pullman district has its own "batting average" which is compared with that of other districts in the country. This is extended to make a comparison of the various regions' performance and the net result has been a fine competitive spirit all the way down the line. A table showing this and graph made up from the data included in the table shows how cooling failures have consistently decreased during the past four years until there were less than half as many in 1956 as there were in 1953.

The result of this competition is that each failure is completely analyzed and promptly acted upon. The information being basic, is very valuable and the nation-wide incidence of each type failure is catalogued for general office meetings with the regional representatives. These are held each fall to determine action to be taken on work to be done during the winter season for improvement the following year.

Perhaps the biggest single improvement in the educational facilities of the Pullman Company has been the advent of a three-car mobile instruction unit. This unit includes most of the devices used for air conditioning and electric lighting in the sleeping cars. These devices are set up for actual "On Car" operation to provide visual education as supplement to the maintenance manual and the other training programs. This unit went into service September 1955 and since that time, instruction classes have been held in 12 terminals along the eastern seaboard, southern and Texas points. Lectures and demonstrations have been given to Pullman employes as well as employes from interested railroads and terminal companies. Present indications are an improvement in air conditioning occurred on cars being serviced at points where the instruction classes have been held.

Other factors which have served to improve air conditioning performance consist of converting some of the older systems to the improved

	1953	1954	1955	1956
March	.103	.047	.059	.026
April	.121	.099	.091	.042
May	.181	.185	.180	.087
June	.304	.256	.236	.161
July	.419	.387	.301	.210
August	.448	.405	.360	.226
September	.457	.417	.349	.228
October	.417	.392	.314	.209

post-war electro-mechanical type. A good example is the high cost, high failure dynamotor type recently converted. Meetings held with various railroads and railroad suppliers have been helpful in eliminating certain troubles, particularly on design problems. The extended use of automatic washing machines for cleaning air filters has reduced air circulation problems and new types of electrical testing devices, etc., have helped in the overall improvement.

The challenge raised by the many types of cooling systems with the numerous variations in control panels and complex electrical circuits is being met successfully. Improved knowledge of the equipment, together with continued attention to basic ideas is the key to success.

From the Diesel Maintainer's Note Book

The Diesel Runs a Fever

By Gordon Taylor

THE CAUSE OF THIS TROUBLE was unusual and is the first of its kind in our case record.

An F-7 Electro-Motive diesel was dispatched from its maintenance terminal apparently in good working order. A short time later the crew was startled to hear the alarm bell ring.

Checking the units to see what was wrong, the fireman found the red alarm signal light burning in one of the trailing units. This, of course, indicated a high temperature in the engine of that unit.

The crew followed regular instructions for checking a hot engine alarm. They checked water level, radiator shutters and fans. All seemed to be as they should be, and the temperature gage did not indicate a temperature of 200 deg, or more, which it would have to be, to cause a hot engine alarm.

In checking further, it was noted the hot engine alarm sounded only when working the unit in the No. 8 throttle position. The crew continued the trip figuring they were getting a false alarm.

The crew made a note on the trip report calling the maintainers' attention to need of checking the cause of the hot engine alarm.

The maintainers checked the unit on its return to the diesel house, but could find nothing wrong. The engine temperature checked properly, and the hot engine alarm failed to sound, so the unit was again returned to service.

Apparently the maintainers failed to make a complete check for trouble, since the crew again got a false alarm indicating hot engine, while the temperature was found to be within reasonable limits.

The maintainers received a second trouble report on this unit and our ace trouble-shooter checked to see what was wrong.

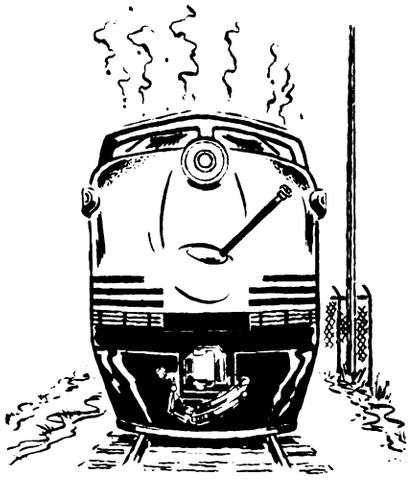
It did not take him long to discover the cause as being due to a defective hot engine alarm switch, E.M.D. part #8099702. What caused it to fail is interesting, as well as instructive.

This switch is a thermal type switch, normally open. It has a feeder bulb located at the water outlet manifold of the engine. The bulb is filled with a heat sensitive gas or liquid which expands or contracts in direct proportion to the temperature to which it is exposed. The feeler bulb is connected by a small capillary tube to the diaphragm in the switch.

When the water temperature in the engine water outlet exceeds 208 deg F, the expansion of the liquid or gas in the bulb, transmits pressure against a diaphragm in the switch. When the switch closes, it lights the hot engine alarm signal light, and energizes the signal relay which rings the alarm bell.

When the inspector checked the hot engine alarm switch, he carefully checked the capillary tube to be certain it was not kinked, broken or otherwise damaged. Seeing nothing wrong with the tube, he removed the feeler bulb at the end of the tube from its housing in the engine water outlet.

He discovered that the bulb was



damaged — apparently by erosion which had opened the bulb wall, allowing the operating liquid or gas to leak away. The bulb and tube were thus exposed to entry of water from the engine cooling circuit. This permitted water pressure to work into the tube and exert pressure against the operating diaphragm in the switch.

The engine was then started up and placed in the No. 8 throttle position. When the water pressure reached a value of 26 psi, the hot engine alarm switch closed. In other words, water pressure instead of water temperature was causing the alarm system to send out a false alarm indicating a hot engine.

Replacing the defective high temperature alarm switch corrected the trouble, and the engine no longer worried about its fever and went on about its business as though nothing had happened.

Before the case can be completely closed, it will be necessary to discover what may cause such erosion and opening of the feeler bulb. That is something to watch for in the future.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

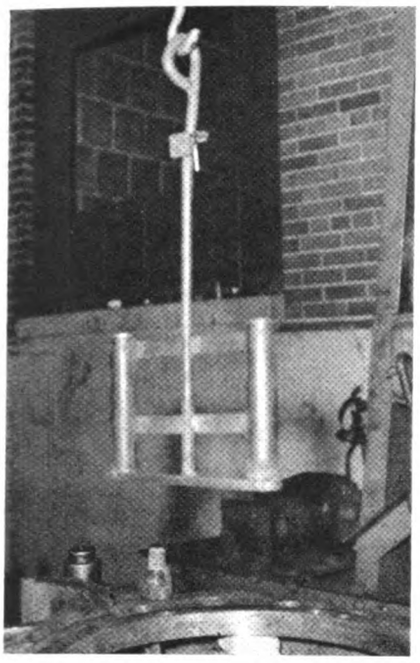


Fig. 1—Device for holding main pole pieces.

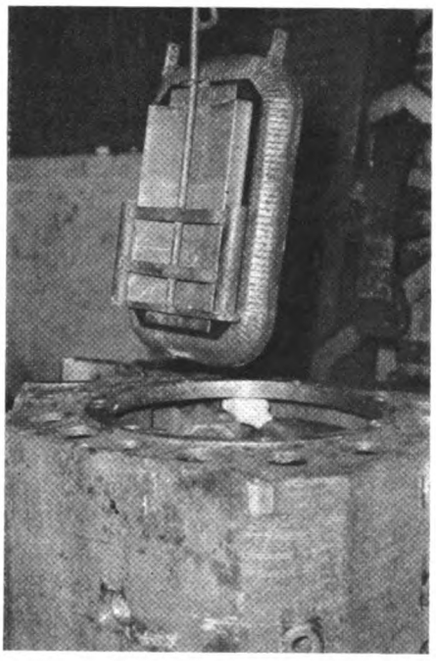


Fig. 2—Main pole piece suspended on hoist ready for lowering into the motor frame.

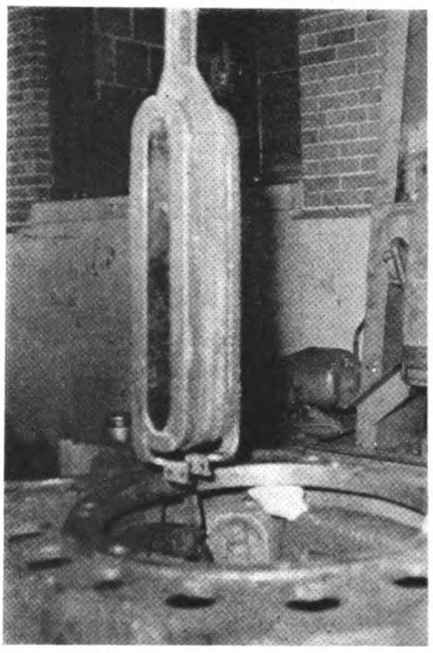


Fig. 4—A loop of webbing is used to handle interpoles.

Erie Shop Has Easy-In for Pole Pieces

TWO SIMPLE DEVICES which make the application or removal of traction motor main poles and interpoles a relatively simple operation are shown in the four illustrations. They were developed in the Marion, Ohio, shops of the Erie and their use has been adopted as regular procedure.

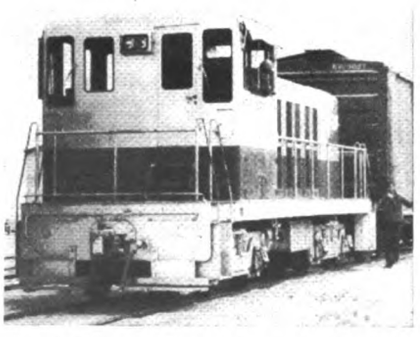
The device for handling main poles is shown in Fig. 1. Welded to the center lifting rod, which has an eye at the top, is a bottom plate and two cross members which in turn are welded to two short sections of pipe. There is a small L-shaped piece having a hole slightly larger than the rod which is free to slide down on the rod to a stop as shown.

The two sections of pipe are so spaced, and of such a size, that they fit into the main pole piece grooves as shown in Fig. 2. The bottom plate then comes in contact with the lower edge of the pole piece and the L-shaped piece slides down over the upper lip of the pole piece to hold it vertically as shown.

The pole piece is then lowered into the motor frame and a rod, having threads corresponding to those on the pole piece cap screws, is pushed through the center cap screw hole and screwed into the pole piece as shown in Fig. 3. The curved outer end of the rod serves as a means for turning the rod. The pole piece is then pulled into place with the rod and the two outer cap screws can be applied without difficulty. The rod is then removed and the center cap screw applied.

The interpole pieces are handled by means of a strap made of webbing. The strap which is just wide enough to fit between the interpole coil terminals is in the form of a loop which fits over the coil as shown in Fig. 4. The threaded rod is used in the same manner to position the pole piece.

Fig. 3—When the threaded rod is screwed into the center hole in the pole piece, it can be pulled into position.



HAULING WITHOUT DOWNTIME. This 70-ton diesel-electric locomotive has operated more than 8,000 hr without downtime in extremely dusty conditions at temperatures ranging from below zero to above 100 deg, at U. S. Gypsum's Empire plant at Empire, Nev. Scheduled daily maintenance has helped the unit make 2 trips a day, 6 days a week, without fail for 26 mos.

24-RL Brake Equipment

This is a new series of Questions and Answers pertaining to recent developments in the 24RL air brake equipment for road locomotives. The first questions will deal with the Pressure Maintaining feature. Authorized persons may obtain information on this subject in Instruction Pamphlets 2606-1, and 2601-1 Supplement 1 by communicating with their nearest Westinghouse Air Brake representative.

R53-Q—What then takes place?
A—The interlock cut-off valve moves forward compressing its spring.

R54-Q—What results from this movement of the piston?
A—Brake pipe air from passage *2a* is cut off by the piston which then connects the chamber above the maintaining cut-off valve piston to the exhaust.

R55-Q—How does this action affect pressure maintaining?
A—Pressure maintaining is inoperative as the spring below the piston causes it to move up taking its stem away from contact with the cut-off check valve which is seated by its spring. Feed valve air is thus cut off from passage *14a* to the equalizing portion.

R56-Q—Describe the initial flow of air at the brake valve cut-off valve (double-heading cock) assembly in *IN* position.
A—With the pilot valve handle in *IN* position the pilot valve piston is positioned to permit flow of main reservoir air from passege *30*, through a passage in the piston and into a passage leading to the cut-off piston chamber (*57*).

R57-Q—What action then takes place?
A—The cut-off piston is moved toward the spring chamber end, compressing the piston spring.

R58-Q—What air connections are made in this position?
A—Brake pipe air from passage *2* is connected to passage *1* to pipe *1* to the main brake pipe.

R59-Q—What other air connections are made with the lever in *IN* position?
A—Main reservoir pressure in passage *10a* from the spring chamber above the service application piston is connected through a cavity in the pilot valve piston to passage *10* to pipe *10* to the safety control system.

R60-Q—What flow of air takes place with the pilot valve handle in *OUT* position?
A—The Pilot Valve Piston is now positioned to cut off main reservoir air from passage *30*, and connects the cut-off piston chamber to atmosphere.

R61-Q—What then takes place?
A—With the air removed from this chamber, the cut-off valve spring moves the valve away from the spring end of the bushing.

R62-Q—What results from this movement?
A—Passage *2* is cut off from passage and pipe *1* and the brake pipe.

R63-Q—What other connection is cut off at this time?
A—Passage *10a* from service application portion is cut off from passage and pipe *10* and the safety control system by the pilot valve piston.

R64-Q—What air flow takes place when the pilot valve lever is moved from *OUT* to *MID* position?
A—Main reservoir air is supplied to passage and pipe *10* to the safety control system.

R65-Q—Why is this action required?
A—The safety control system must be recharged before cutting in passage *10a* connected to service application piston chamber and to passage and pipe *10* to the uncharged safety control system.

R66-Q—What would be the result if the handle were brought from *OUT* to *IN* position without pausing in *MID* position?
A—Air would be drawn suddenly from above the service application piston. Main reservoir pressure beneath the piston would cause the piston to rise and initiate a service safety control application.

R67-Q—What does automatic service position of the brake valve produce?
A—The proper rate of brake pipe pressure reduction to cause a service brake application.

R68-Q—What initial flow of air takes place when the brake valve handle is placed in service position?
A—The exhaust port in the rotary valve seat registers with passage *4*, allowing chamber *D* and equalizing reservoir pressure above the equalizing diaphragm to escape through the exhaust to atmosphere.

R69-Q—What action results from the reduction of air above the diaphragm?
A—As all other ports are closed, the fall of pressure in chamber *D* causes brake pipe pressure beneath the diaphragm (*703*) to move diaphragm follower (*704*), clamping plate (*705*) and attached plunger upward.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

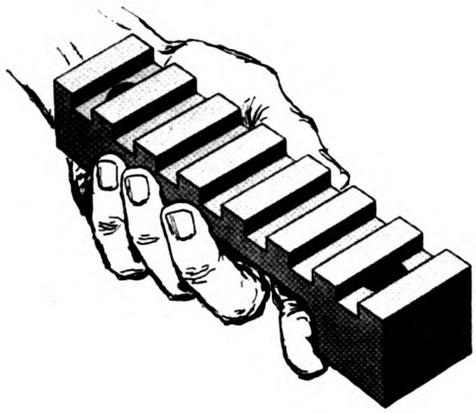
Freezing Weather Precautions.
Manual 2310, Page 223.

G573-Q—What must be done in freezing weather if an A unit is shut down and train line steam is available?
A—The steam admission valve into the engine and the G valve on the cooling water supply tank must be opened.

G574-Q—Where is the steam admission valve located?
A—On the engine room floor at the left front corner (governor end) of the engine.

How R-S JOURNAL STOPS will further Reduce Solid Bearing Operating Costs

and pay for themselves in less than 3 years!



Tests have proved that this new device will greatly improve bearing performance and journal lubrication, will at least double bearing life, reduce wheel flange wear and make other significant savings in freight car operation.

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Second, all indications point to 3-year periods between periodic attention as required by Rule 66. That would cut current costs in half — save as much as $6.00 per car per year.

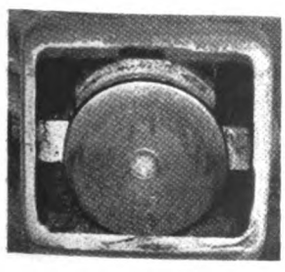
Third, and conservatively, you'll reduce road repair costs to a third of what they now are — possibly a great deal more. That means minimum savings of $6.00 per car per year.

Fourth, you'll cut bearing consumption in half — use less than 1½ bearings per car per year. In annual savings that will mean about $4.00 per car.

The above four items alone represent potential annual savings of $34.00 per car. Add to these the tremendous savings due to reduced wheel flange wear and a 3-year recovery estimate is probably conservative.

One private car company whose total savings are determined largely by billings that don't cover servicing costs, has already estimated recovery of total installation costs in less than 3 years. Operating roads will save even more. Write us today for full information. Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

**These and other estimated savings are based on unbiased studies of AAR solid journal bearing operating costs.*



Unretouched photo of the RS Journal Stop installation with conventional waste packing. Other lubricators are similarly "contained."

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

QUESTIONS AND ANSWERS

G575-Q—With what other valve could the steam admission valve be confused?
A—The engine drain valve.

G576-Q—Referring to Fig. 2-4, what valves should be operated?
A—Close valve *3* and open *2* and *7*. Valve *4* should be closed, valve *9* cracked open, to allow condensate to drain.

G577-Q—What steps are necessary on a B unit?
A—On a B unit, it is only necessary to open the steam admission valve and the G valve to accomplish the same purpose.

G578-Q—What must be done if trainline steam is not available?
A—The entire system must be drained.

Engine and Steam Generator Inoperative.

G579-Q—What valves on the engine cooling system must be opened in this case if steam is supplied from an external source to prevent freezing?
A—The steam admission valve to engine cooling water, the steam supply valve to cab heaters, the G valve, and the toilet water tank valve.

G580-Q—What valves to the steam generator should be opened?
A—The heating coil valve, the water suction line valve, and the water tank valve. For detailed instructions see Section 6-Manual 2310.

G581-Q—From what should water be drained if heating facilities are not available?
A—The engine cooling system, cab heaters, steam generators, steam generator water tank, toilet water tank, and the G valve.

G582-Q—What else should be drained in this case?
A—The air system.

Manual 2310, Page 224.

G583-Q—What parts of an air compressor should be drained?
A—The oil separator and the inter cooler.

G584-Q—Which reservoirs must be drained?
A—The No. 2 main reservoir under cab floor and upper and lower sump reservoirs.

G585-Q—What other parts should be drained?
A—The type H filter, electrical control air regulator, electrical control air reservoir, and the strainer at the engine control electrical panel and electrical control cabinet.

Splitting and Joining Units.

G586-Q—What must be done first when splitting units?
A—All jumpers must be taken down (inside and outside the diaphragm).

G587-Q—What else should be done?
A—Angle cocks or cocks on both units should be closed on all air hose and hose to separate units broken by uncoupling.

G588-Q—What must first be done when joining units?
A—After coupling, units should be stretched to insure locking of couplers.

G589-Q—What should follow?
A—Hose and jumpers should be connected and all angle cocks and cocks on all hose opened in both units.

G590-Q—What else should be done?
A—Brakes and all control switches should be cut out in all but operating unit and reverse lever in trailing A unit removed.

Towing Locomotive.

G591-Q—What must be the position of reverse lever on a locomotive to be towed?
A—The reverse lever must be in the *neutral* position.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Bulletin 1706, Sec. 104A, Page 7.

F499-Q—What should follow?
A—Reverse handle should be inserted and air brake tests made.

Operating with Leading Unit Shut Down

F500-Q—What do you do at the leading unit in this case?
A—Snap *off* control and fuel pump breakers at the leaf unit engineer's breaker panel.

F501-Q—What do you do at the trailing unit?
A—Snap the respective breakers *on*.

F502-Q—What action should be avoided?
A—Avoid having both ends *on* at the same time.

F503-Q—What harm may result from disregard of above?
A—Battery equalizing currents may be enough to damage control wiring.

F504-Q—What should be done in case any heavy knocking or any other unusual noise from the engine is apparent?
A—The engine should be shut down at once.

F505-Q—What should be done at the derailed truck?
A—The traction motors should be cut out.

F506-Q—What care must be taken during rerailing?
A—Care must be taken to prevent the wheels from slipping off the frog during rerailing, to avoid serious damage to the traction motors or gear cases.

Dynamic Braking
Operation of Controls

Bulletin 1706, Sec. 110-A, Page 1.

F507-Q—When dynamic braking what should be done with respect to the number of units in the locomotive?
A—The dynamic brake unit switch behind the engineer's seat should be set for the number of units in the locomotive.

F508-Q—What else should be done?
A—The dynamic brake circuit breaker on the panel behind engineer should be in the *on* position.

F509-Q—What does this breaker control?
A—This breaker controls the field loop excitation circuit.

F510-Q—What should be done upon entering dynamic braking?
A—Upon entering dynamic braking, always wait a few seconds in each control stop before proceeding.

F511-Q—Why is this delay necessary?
A—To prevent excessive current surges and motor flash overs.

F512-Q—With what other medium can the train retarding action of the dynamic brake be compared?
A—The dynamic brake retards the train similarly to a strong independent brake, so that the same care must be used in controlling slack.

F513-Q—With the dynamic brake circuit braker in *on* position what should be done next?
A—The throttle should be placed at *idle*.

Name the load on your road

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Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

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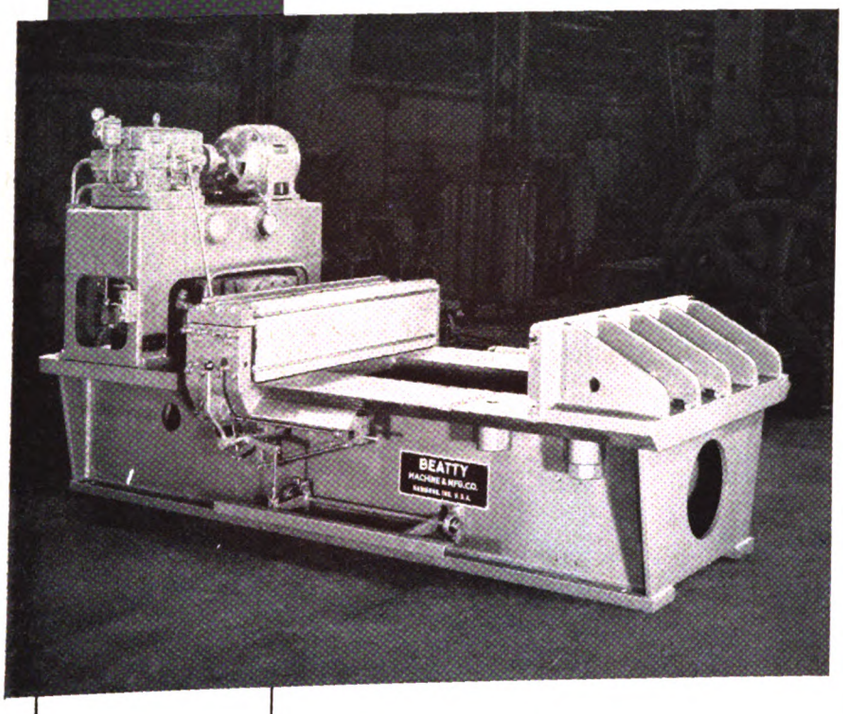
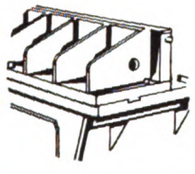
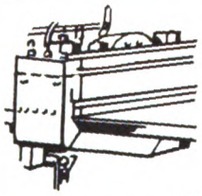
RAPID PRODUCTION & RETURN SPEEDS BOOST OUTPUT





Resistance bolster is keyed and bolted to table for die space change or use of special bolsters.



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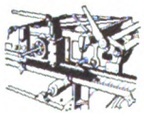

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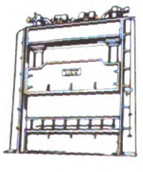
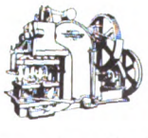


Vertical Bulldozer



Heavy Duty Punch

SUPPLY TRADE NOTES

(*Continued from page 20*)

sion, National Bearing Division, Ramapo Ajax Division, and Southern Wheel Division.

John S. Hutchins, executive vice-president and director of American Brake Shoe, has overall responsibility for the new division. He was formerly president of both Ramapo and National Bearing Division.

Stephen S. Conway, a Brake Shoe vice-president and president of the Brake Shoe & Castings Division, has been named president of the new Railroad Products Division. *Eads Johnson, Jr.,* president of Southern Wheel Division, is vice-president, sales. *Roy L. Salter,* first vice-president of Southern Wheel Division, has charge of the production department. *Raymond A. Frick,* vice-president, Brake Shoe & Castings Division, is assistant vice-president of production. The engineering department is headed by *Rosser L. Wilson* as vice-president. Mr. Wilson has been director of mechanical engineering at the Mahwah research center and vice-president and chief engineer of Brake Shoe & Castings Division.

Within the new Railroad Products Division, four staff product managers supervise the lines of products offered by each of the former divisions. They are Joseph P. Kleinkort, for the Racor line of trackwork and specialties; John F. Ducey, Jr., brake shoe product line; Daniel C. Poor, wheel products; and Harry E. Connors, bearing products.

Three regional sales areas are being established. *Sam R. Watkins* has been named head of eastern region sales at New York; *Ralph L. Robinson,* central region sales at Chicago; and *Westley C. Muller,* western region sales at San Francisco.

■

LINK-BELT COMPANY.—District sales managers have been transferred as follows: *George A. Most, Jr.,* to Boston; *J. Charles Bullock* to Moline, Ill.; *Gene A. Zwerner* to Albany, N.Y.; *C. C. Wiley* to Washington, D.C., and *Paul Waldorf,* a sales engineer, appointed district sales manager at Baltimore.

■

DANA CORPORATION.—*G. Leonard Smith,* has become mid-western representative at Chicago.

■

GIDDINGS & LEWIS MACHINE TOOL COMPANY.—*John M. Dolan,* has been appointed vice-president-general manager, field sales division.

■

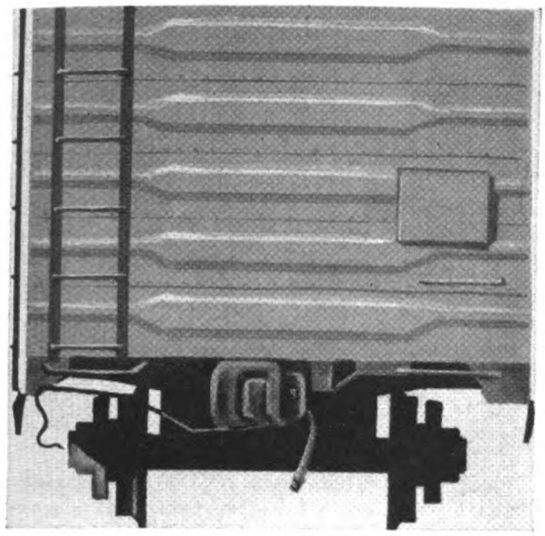
W. H. MINER, INC.—*R. J. Olander,* assistant to vice-president, mechanical, has been appointed director of Miner's Research and Development Department.

■

OKONITE COMPANY. — *Robert B. Zane,* district engineer at Chicago, has been appointed railroad sales manager for the Chicago district.

■

CRUCIBLE STEEL COMPANY OF AMERICA.—The Spring Division has moved its sales headquarters from New



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Special wheel steel, toughened by forging and rolling, packs extra service miles into every Armco One-Wear Wheel. That's why they're economical—give you more service in return for your wheel dollars.

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More difficult to measure, but just as important, are these day-to-day advantages you get from Armco One-Wear Wrought Steel Wheels: Faster freight schedules to satisfy shippers, greater safety, and no maintenance.

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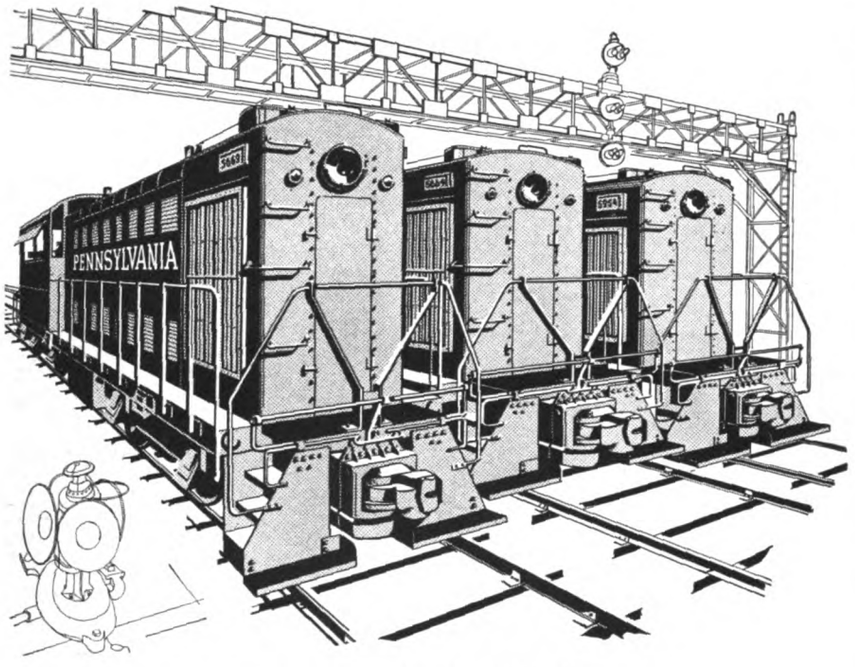

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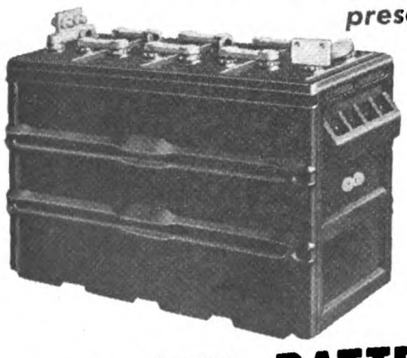
Add this remarkable plate alloy to C & D's Five-Fold Slyver-Clad insulation and retention which has virtually eliminated shedding, and you have the finest Diesel starting battery available.

Can you get this in your present Diesel starting battery?



- *Up to 50% more life than conventional batteries?*
- *Once a year water additions?*

If your present Diesel starting batteries don't measure up—it will pay you to investigate C & D. Write for Bulletin DL-577/56.

C&D BATTERIES, INC.
of Conshohocken, Pa.
SINCE 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

R. C. Lawson

York to Pittsburgh. *W. K. Krepps* has been appointed assistant to the general manager and *Richard C. Lawson*, sales manager of the division. Mr. Krepps' will be located in New York.

■

A. J. Marcussen

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION. — *Arthur J. Marcussen* has been appointed district sales representative, Chicago region. Mr. Marcussen was previously sales engineer in the rebuild section.

HYATT BEARINGS DIVISION.—*Albin D. Edelman* has been appointed assistant chief engineer-railroad bearings, and *Ralph Altson* chief design engineer-railroad division. Mr. Edelman, who succeeds *Richard J. Brittain*, on extended leave of absence, was formerly division engineer-railroad bearings, and Mr. Altson was drafting group supervisor.

■

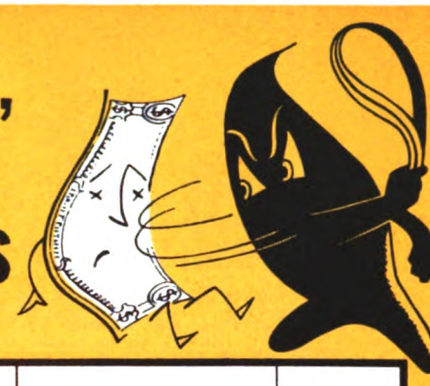
NATIONAL CARBON COMPANY.—*William C. McCosh*, manager of the central division of carbon products sales at Chicago, has been named manager of railroad and industrial brush sales at New York. ■

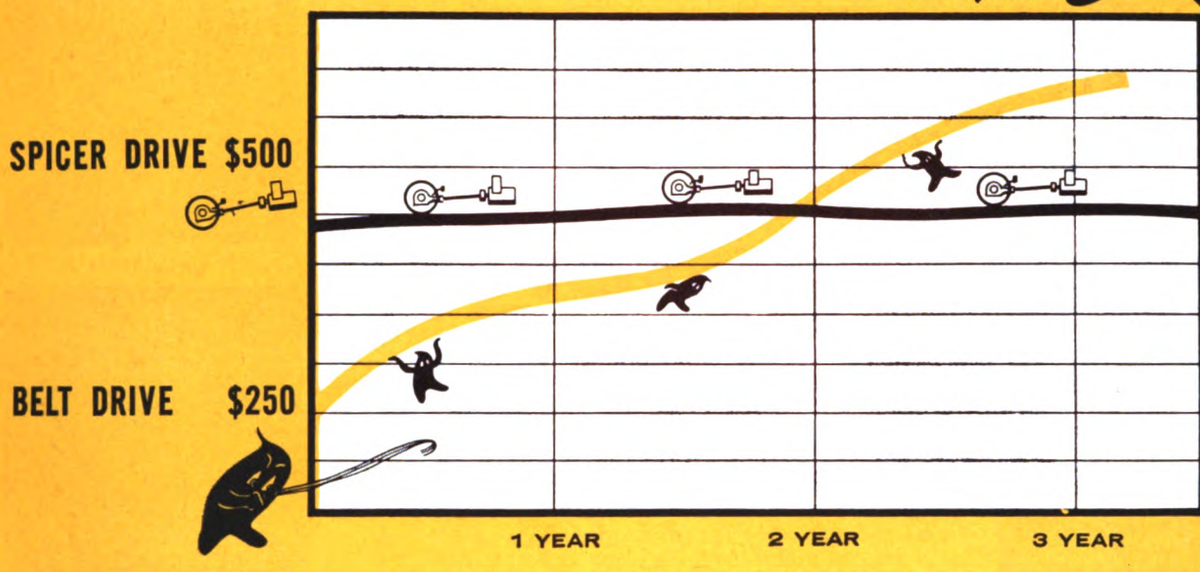
OGONTZ CONTROLS COMPANY.—*Bruce C. Gunnell* has been appointed railroad representative in the southeastern states. ■

SPRAGUE DEVICES, INC.—*Lawrence E. Vogt* has been appointed sales manager. ■

EDGEWATER STEEL COMPANY.—Edgewater has opened a new St. Louis district office in the Railway Exchange

Don't get "belted" by belt drive generator costs





Get the actual costs between belt-drive and Spicer Positive-Drive Generators . . . and find out what belt drives really cost you!

How much are replacement belts going to cost you?

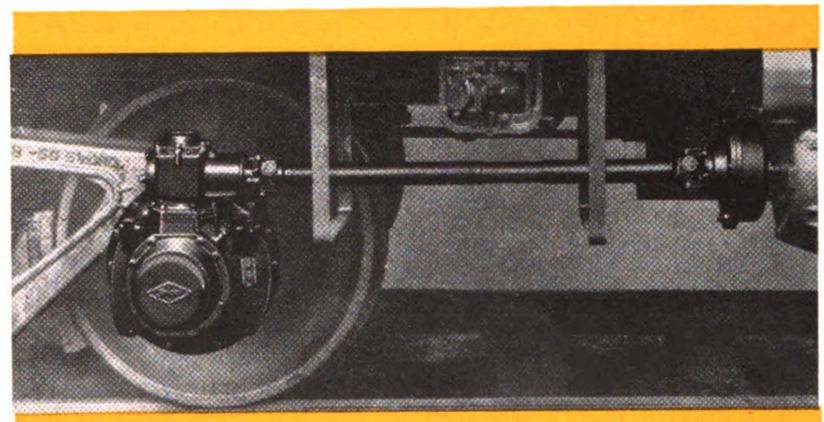
How often will they need replacement?

How much will labor for belt replacement cost?

How much will depleted batteries and shorter battery life due to belt failure cost you?

How much will loss of communications and its subsequent dangers cost you?

These are constant and continuing belt cost factors you cannot escape. Investigate the long-life economies and dependable performance of the Spicer Positive Generator Drive before you buy! Five ratios available for driving all makes and types of generators up to 5 KW.



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs. Write for further details.

DANA CORPORATION
Toledo 1, Ohio

Spicer

SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES • PARISH FRAMES • SPICER FRAMES

LIX

DIESEL KLEAN HEAVY IS SIX ways better!

SAFER IN BODY CONTACT

Inhalation tests, skin absorption tests and oral toxicity tests conducted by one of the nation's leading research laboratories prove that Lix Diesel Klean Heavy is of low toxicity.

SAFER FROM STANDPOINT OF FLAMMABILITY

Because of its high flash point, Lix is NOT A FIRE HAZARD.

Lix is HARMLESS TO ALL METALS during cleaning cycle.

SAFER FOR ALL DIESEL PARTS

Lix REDUCES CLEANING TIME and LABOR to very minimum. No brushing or scraping necessary. Just SOAK parts in Lix and rinse with water or mineral spirits. All types of metals can be cleaned in one tank.

FASTER

Lix CLEANS MORE THOROUGHLY. Dirtiest engine parts cleaned quickly as sparkling-bright as new.

CLEANS BETTER

Lix is actually FAR MORE ECONOMICAL in the long run than less expensive cleaners because of the long life without frequent new charges. This long-run saving in operating costs is one of the reasons why more and more railroads are relying on Lix Diesel Klean Heavy for cleaning aluminum and cast-iron pistons, fuel filters, cylinder heads, brush holders, airbrake assemblies, etc.

SAVES MONEY

Write, wire or phone for a no-cost, no-obligation DEMONSTRATION in your shop. Let a Lix representative show you how you can do a *better* locomotive-cleaning job *faster, more safely,* and at *less cost!*

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix CORPORATION
(OF MISSOURI)
PRODUCTS OF RESEARCH

716 EAST 85TH STREET, Dept. RL-2
KANSAS CITY, MISSOURI

"Leadership in Industrial Cleaning"

Building, where *P. H. Yorke,* of the Pittsburgh sales staff, has been appointed district manager. *D. W. Odiorne,* who formerly covered the St. Louis territory, continues as district manager at Chicago.

■

A. C. Brown

D. D. Spoor

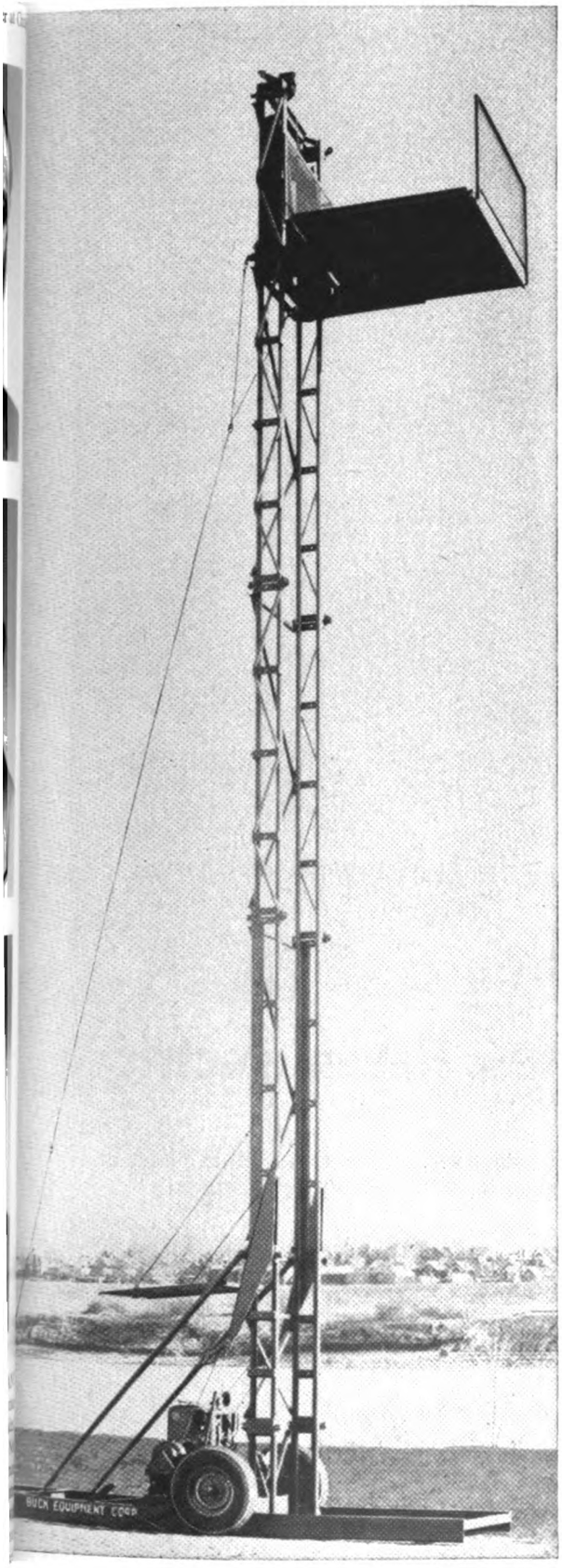
J. J. Lincoln

AIR REDUCTION SALES COMPANY. —*A. C. Brown, Jr.,* general sales manager, has been named vice-president, eastern region, with headquarters in New York. *D. D. Spoor,* equipment sales manager at New York, has been appointed vice-president, midwestern region, with headquarters in Chicago. *J. J. Lincoln, Jr.,* vice-president at New York, has been named vice-president, southern region, with headquarters in Houston, Tex.

Air Reduction has acquired the assets and business of Jackson Products,

(*Continued on page 82*)

How Shelby Seamless Tubing makes a "Buck" go farther



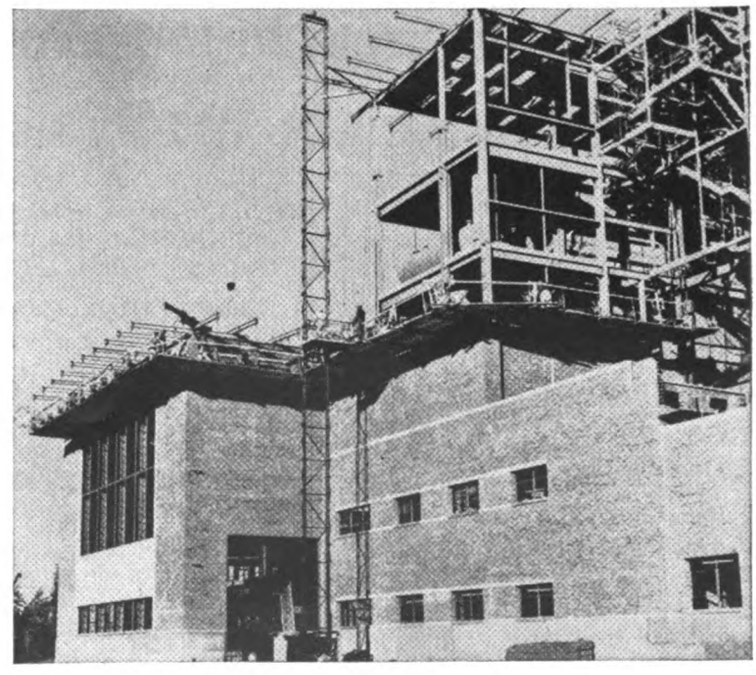
The platforms of these Buck Equipment Corporation Hoisting Machines* *do* go farther—farther *up*, thanks to Shelby Seamless. Although standard tower heights range from 25 to 40 feet, some of these unique heavy-duty rigs boast towers up to 150 feet in height!

The slender tower of the Buck Portable Hoisting Machine is constructed of $2\frac{3}{8}$" OD x .120" wall, cold drawn sections of Shelby Seamless Mechanical Tubing, which afford both the structural support for the equipment and the track on which the platform moves. Self-erecting, the tower unfolds like a jackknife—raises or lowers in 2 minutes, 11 seconds. Operating power is supplied by a 21 H. P. air-cooled engine.

Here is an application where the use of seamless tubing is virtually mandatory. What other material could supply the combination of high strength, light weight, and flexibility needed to make a completely portable hoist that would unlimber in minutes, then send a 2000-pound load of building bricks soaring up its vertical track at the rate of 140 feet per minute?

Shelby Seamless Tubing possesses the strength, uniformity and dimensional accuracy that make it ideal for structural applications such as this. Produced to exacting standards by the world's largest manufacturer of tubular steel products, Shelby Seamless is available in a wide range of diameters, wall thicknesses, various shapes and steel analyses. You are invited to consult our engineers at any time. They will make a study of your product requirements and will help you to apply Shelby Seamless to your specifications.

**Manufacturer's name on request.*



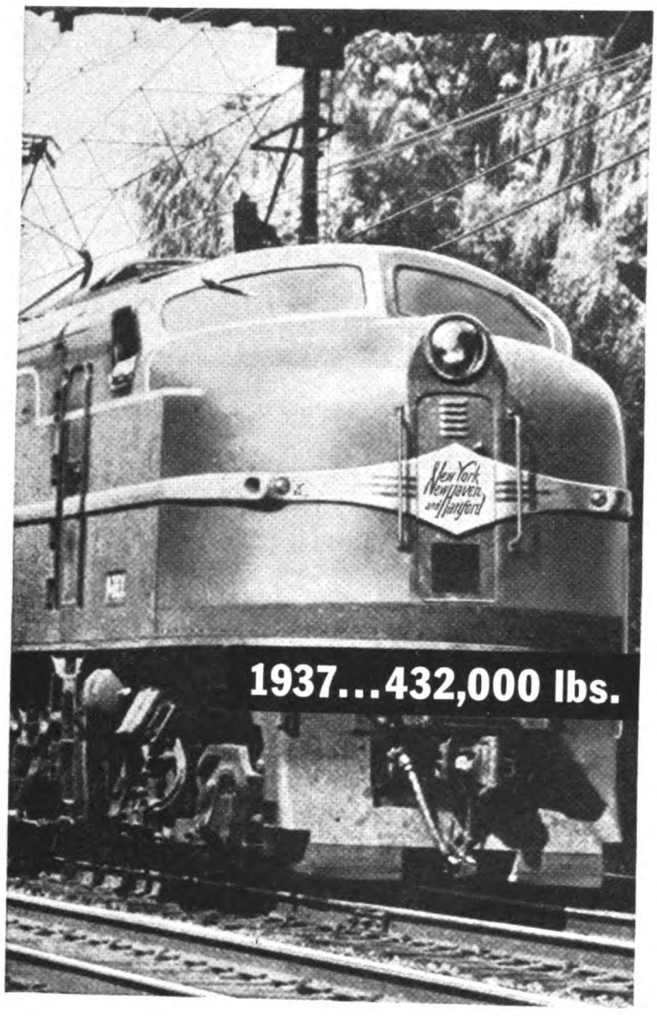
NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SHELBY SEAMLESS MECHANICAL TUBING

WALLS WITHOUT WELDS

UNITED STATES STEEL



BEFORE...AND AFTER MAYARI R STEEL

High strength low alloy Ni-Cu steel helps cut deadweight 19% in new New Haven electric

That crack streamlined electric at the right weighs 81,500 pounds less than the '37 locomotive.

This impressive 19% weight reduction was brought about through design improvements made possible with Mayari R – Bethlehem's nickel-copper high strength low alloy steel.

High yield point key factor in variety of structural weight reductions

Mayari R has a yield strength of 50,000 psi minimum in most commonly used sections, in the as-rolled condition. This – together with its good resistance to corrosion, abrasion and impact – permits safe weight reduction in side sheets . . . platform . . . main and side sills . . . top and bottom plates and other important structural components.

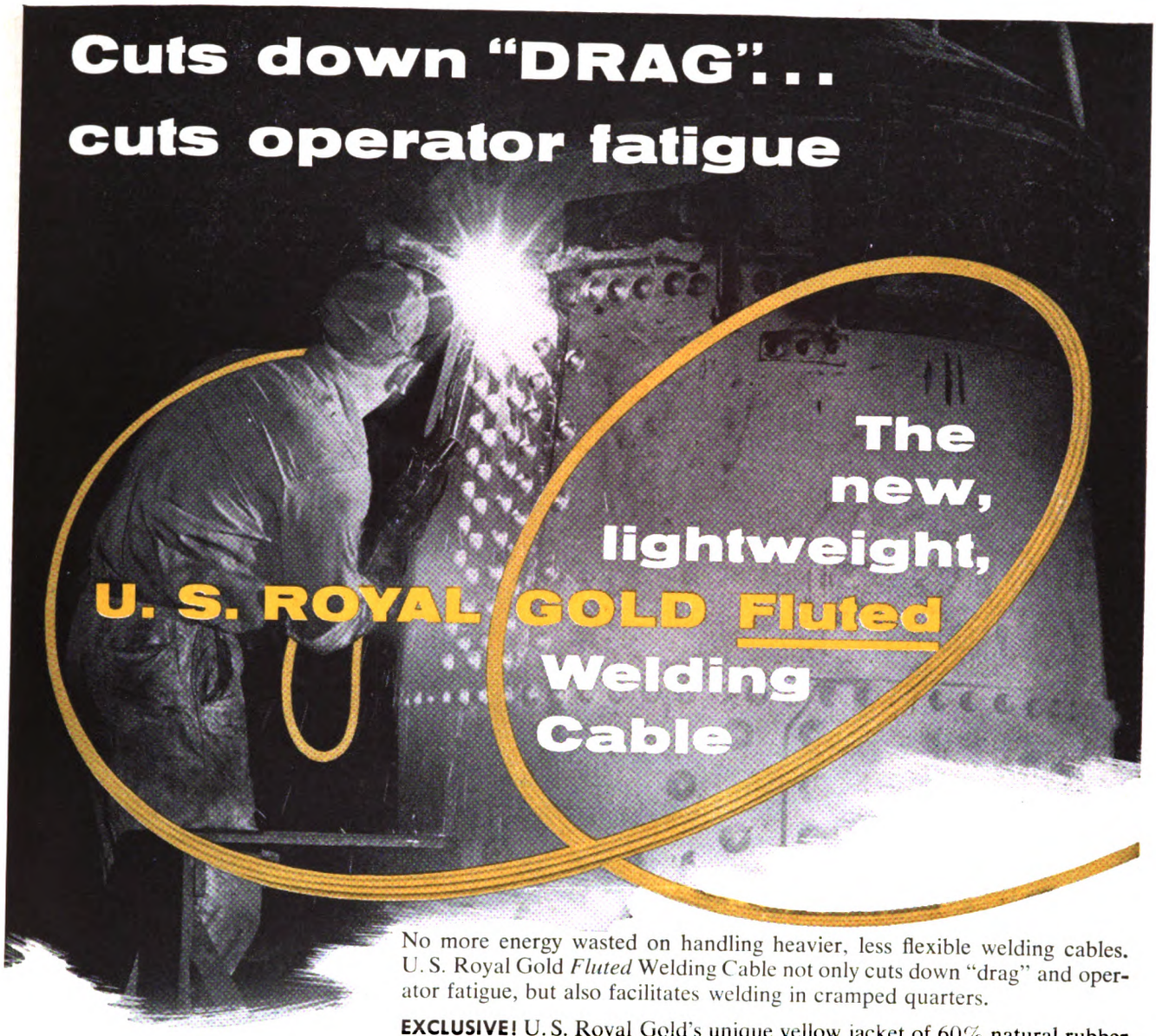
If you want to reduce deadweight . . . add payload capacity, chances are you'll find just the combination of properties you want in high strength low alloy nickel-copper steels. They're stronger and tougher than plain carbon steels. And they're readily formed and welded.

Complete information available

New manual, "Nickel-Copper High Strength Low Alloy Steels", tells all you need to know about these nickel steels . . . their properties, how they cut weight, and much, much more. Just write.

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

Cuts down "DRAG"... cuts operator fatigue



No more energy wasted on handling heavier, less flexible welding cables. U. S. Royal Gold *Fluted* Welding Cable not only cuts down "drag" and operator fatigue, but also facilitates welding in cramped quarters.

EXCLUSIVE! U. S. Royal Gold's unique yellow jacket of 60% natural rubber provides unbeatable visibility, reduces the hazard of accident which is present with *black* cable. Also, the yellow provides contrasting color to black for conductor identification when two cables are used on welding machines.

LONGER LIFE! The greater flexibility of U. S. Royal Gold means greater dependability at terminal connections, minimum maintenance. Higher visibility reduces danger of accidental damage, adds more life to cable.

COOLER TO HANDLE! The unusual *fluted* jacket provides greater surface area and thereby dissipates heat faster.

SUPERIOR IMPACT RESISTANCE! Proved by tests to be greater than that of conventional constructions.

GREATER MOISTURE RESISTANCE! That's because of the special 60% natural rubber insulation. Added protection is provided by the jacket, also of 60% natural rubber. Get U. S. Royal Gold at electrical supply houses.

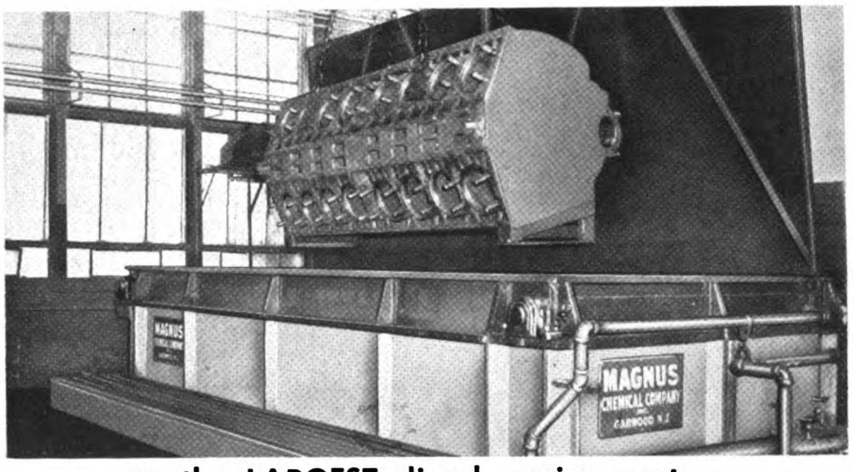
Free Folder Gives Facts demonstrating the superiority of U. S. Royal Gold Fluted Welding Cable. Write to us for your copy at Rockefeller Center, New York 20, N. Y.

US RUBBER

Electrical Wire & Cable Department

United States Rubber

From the smallest . . .



to the LARGEST diesel engine part . . .

ONE METHOD CLEANS ALL— FASTER, MORE ECONOMICALLY

Everything, from the smallest injector part to the block of a 16-cylinder engine, can be cleaned faster and at lower cost when the Magnus Method of mechanical agitation is used. It's the modern, labor-saving cleaning method now in use by operators of 76% of the diesel horsepower on class 1 roads.

There's a wide range of Magnus agitating cleaning equipment available—from small bench units for cleaning small, delicate parts to a 6½ ton capacity machine for cleaning diesel blocks. These, together with the recommended Magnus cleaner are guaranteed to substantially lower your cleaning costs with greatly improved cleaning results.

If you are not already using the Magnus method in your shops and are interested in the savings it can make for your road, a Magnus railroad specialist will gladly give you full information. Or, write for the Magnus Railroad Cleaning Handbook. Magnus Chemical Co., Inc., 77 South Ave., Garwood, N. J.

magnus

RAILROAD DIVISION

MAGNUS CHEMICAL CO., INC.

a world-wide organization specializing in cleaning and protection of all surfaces.

SUPPLY TRADE NOTES

(*Continued from page 78*)

Inc., of Detroit, manufacturer of welding electrode holders, welding helmets, safety goggles, and other welding supplies for the electric arcwelding field. Present distribution channels will be maintained. *A. C. Gilbert* is general manager.

■

JOSEPH T. RYERSON & SON, INC.—*Alfred J. Olson,* sales manager, has been appointed general sales manager at Chicago.

■

THOR POWER TOOL COMPANY.—*Kenneth V. Bennett* has been appointed manager of the new branch office at 2024 Chamberlayne avenue, Richmond, Va.

■

CHICAGO RAILWAY EQUIPMENT COMPANY AND SUPERIOR CAR DOOR COMPANY.—*Philip A. Laret* has been appointed southwest representative at St. Louis.

■

CRANE COMPANY.—*Neele E. Stearns,* vice-president for planning and development of Inland Steel Company, has become president of the Crane Company.

■

MAGNAFLUX CORPORATION.—*Roy O. Schiebel,* sales manager, has been appointed to the newly created position of second vice-president, sales and marketing, with headquarters in Chicago.

■

EVANS PRODUCTS COMPANY.—Evans has entered into an agreement for the acquisition of substantially all of the assets of the *Haskelite Manufacturing Corporation,* Grand Rapids, Mich. Haskelite manufactures doors, door units and laminated wood products.

■

WAUGH EQUIPMENT COMPANY.—*Stanley H. Fillion,* research engineer, has been appointed chief engineer. *Walter C. Dilg* has been appointed assistant chief engineer.

■

DIESEL RECLAMATION SERVICE COMPANY.—*J. E. Hammett,* formerly assistant to general master mechanic, Louisville & Nashville, has been appointed sales representative of Diesel Reclamation in the southern states.

This is the fourteenth in a series of advertisements about the people of Standard.

Occupation: Railroading
Hobby: Railroading

Meet Ralph M. McLean, Jr.

All his life he's been a railroad man, carrying along an old family tradition established by his grandfather and father.

When he's not on the road for Standard, Ralph makes Chicago his home—a home brightened by his charming wife, an active son and a lovely daughter.

On the job, Ralph sells Standard products to the railroads of the Southwest, providing the service and assistance that are the mark of a Standard salesman.

All of the Standard team is instantly ready to provide the finest service there is—whether your order is for one car or hundreds—for new car parts or replacements.

You can depend on Standard to get cars on the road, paying their way.

Improved Dreadnaught Ends

Diagonal Panel Roofs

9 out of 10 house cars now in operation on America's railroads are equipped with Standard Ends and Roofs.

Standard RAILWAY EQUIPMENT MANUFACTURING COMPANY

General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco

Standard Railway Equipment Manufacturing Company, (Canada) Ltd. Sun Life Building, Montreal

EQUIPMENT

(*Continued from page 10*)

light weight. Its orbital type action is powered by a universal series wound motor for a-c or d-c operation, delivering a 6,200 rpm. It weighs 5 lb.

The sander is 8-in. long (9½ with knob) and has a 10-ft lead cord. The sanding area is 4½ by 5⅛ in. The orbit is 3/16 in.

The sander can also be had in kit form (No. 16K). The kit includes 18 abrasive sheets, permanent-type template, two felt pads, Neoprene contour pad, lambs' wool cover and a fitted steel case. *Thor Power Tool Co., Speedway Mfg. Div., Dept. RLC, Cicero, Ill.*

Lining Material

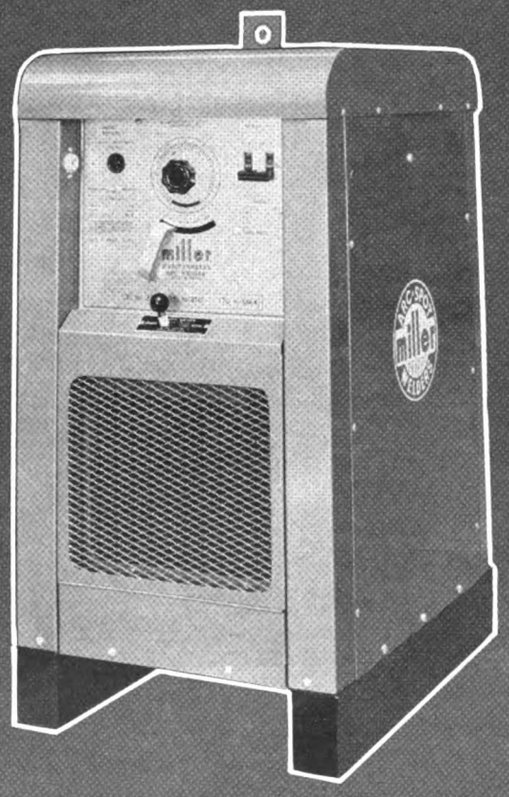
Conoglas, a lining laminate, has been developed to line bins, tanks, freezers, freight cars, and similar food storage or shipping containers. This glass fabric reinforced polyester laminate is produced by a continuous process. It is available in 150-ft rolls or cut sheets, 36 in. wide.

The material is said to provide a durable, stain-resistant and waterproof surface. It is white and flexible and will not support the growth of either mold or fungus. It is non-toxic and cannot stain or corrode when washed with disinfecting chemicals, including household bleach.

The laminate is .018-in. thick and weighs .150 lb per sq ft. It is reported to be unaffected by alcohol, mineral acids, vegetable oils, salt water, weak alkalis or common solvents such as toluol, heptane and carbon tetrachloride.

Installation methods vary slightly with each use. Generally, the material adheres with contact adhesives, epoxy adhesives or mastics. *Continental Can Co., Conolite Div., Dept. RLC, 205 West 14th st., Wilmington 99, Del.*

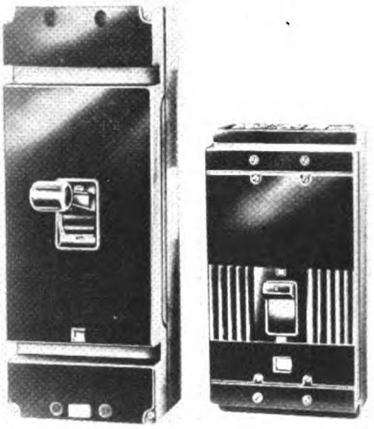
"...if it's Miller you know it's the finest..."



Wherever industry exploits the greater profit possibilities of arc welding processes, Miller selenium rectifier type dc welders have earned re-order respect.

Adapted by design to widest range of specialized and automatic applications, the Miller SR series is offered in single or duplex models of from 200 to 1200 amperes with 60% duty cycle ratings. Lowboy units (27½" high) for stacking.

miller ELECTRIC MANUFACTURING CO., INC.
APPLETON, WISCONSIN
distributed in Canada by CANADIAN LIQUID AIR CO., LTD. Montreal



Circuit Breakers of Reduced Size

A compact 800-amp molded case circuit breaker which is 6½ in. shorter than conventional breakers of the same rating has been announced by GE.

Designated as the KM-frame breaker, this design covers applications now using M-, L-, and KL-frame sizes. It permits space savings in the ultimate size of the equipment in which it is incorporated, and at the same time simplifies stocking by making possible standardization on a single equipment design.

One frame size can now be used for all ratings from 125 through 800 amp. Savings in space up to 30 per cent for each breaker are possible in ratings above 400 amp.

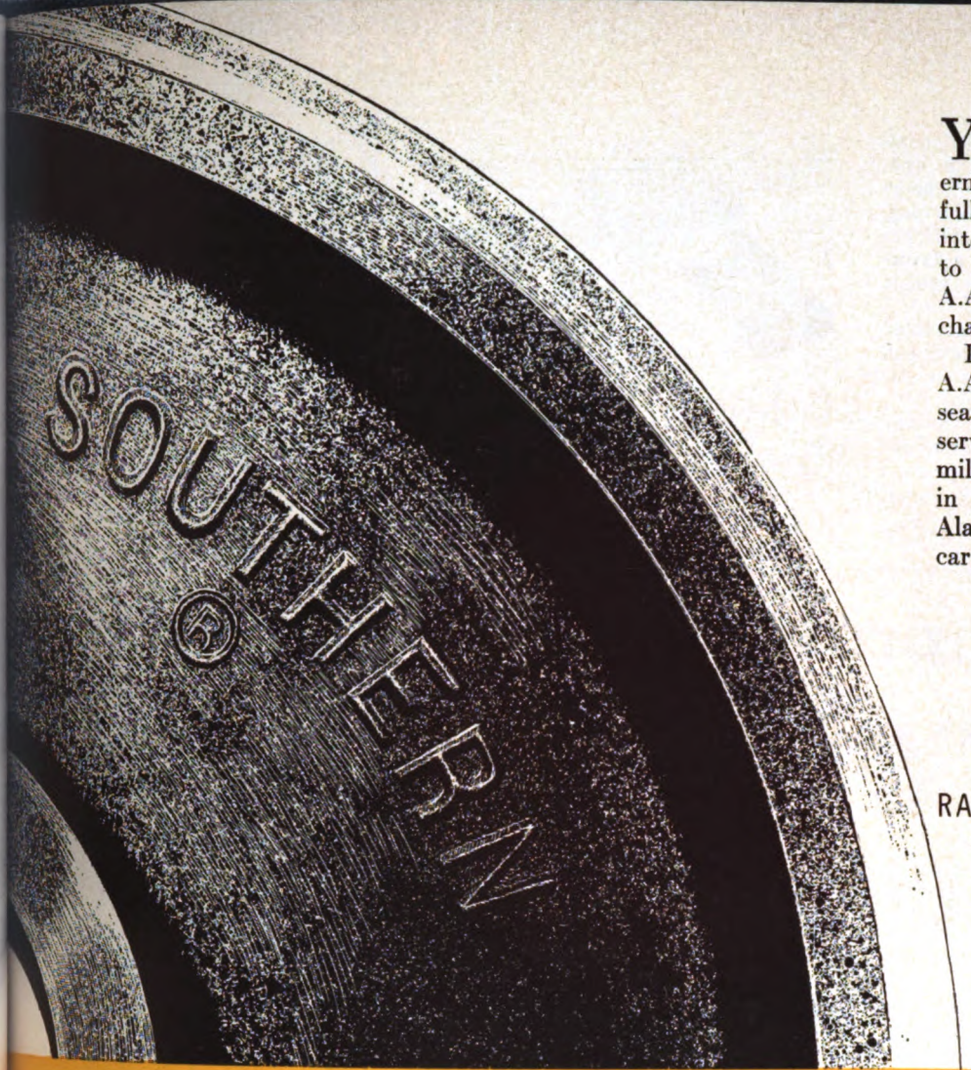
The breakers are available in 2- and 3-pole designs. The 2-pole units are rated 125 to 800 amp, 600-volts a-c; and 125 to 600 amp, 250 volts d-c. The 3-pole units are available in ratings of 125 to 800 amp, 600-volts a-c.

Interrupting ratings of the new breaker are 50,000 amp rms asymmetrical at 240 volts a-c; 35,000 amp at 480 volts a-c; 25,000 amp at 600-volts a-c; and 20,000 amp at 250 volts d-c.

The breaker is Underwriters' Laboratory listed through 600 amp. *General Electric Company Circuit Protective Devices Department, Plainville, Conn.*

Molded Car Seats

These foamed vinyl seats have less than a dozen components. The integral



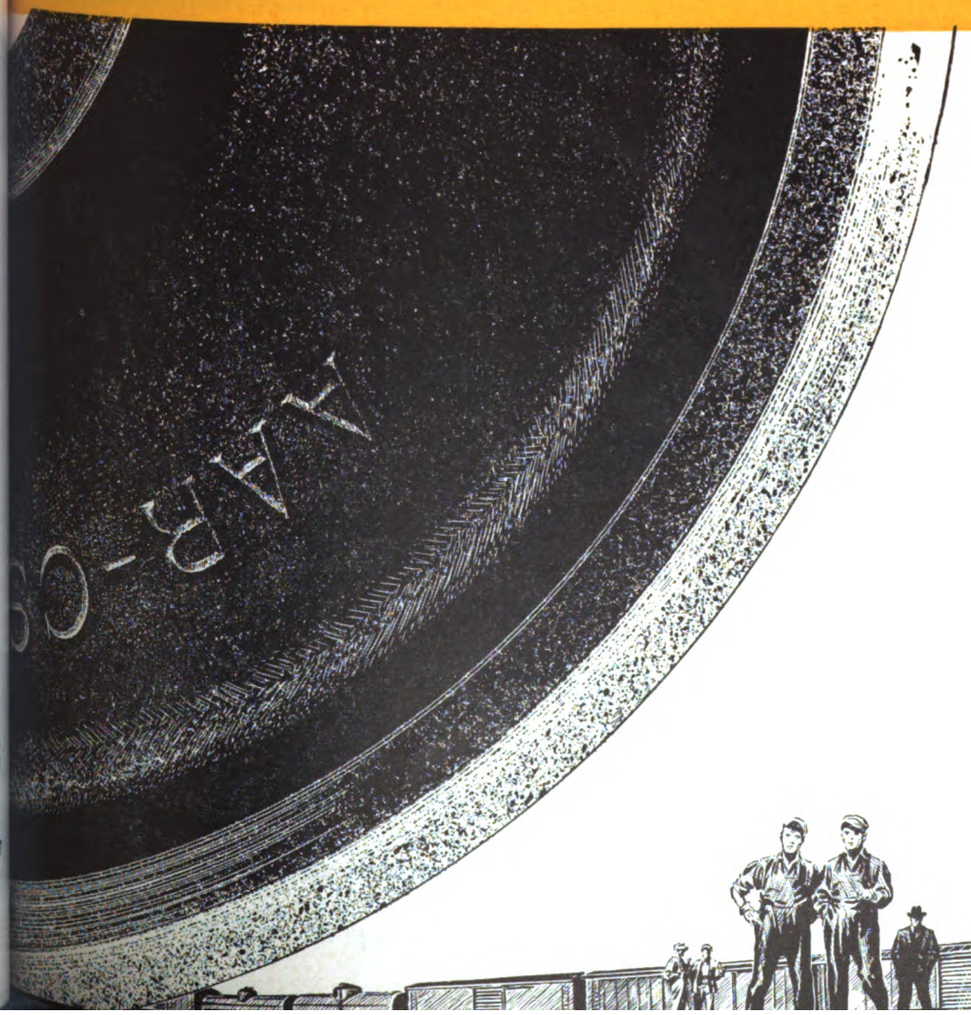
YES! Effective March 1, 1957, the Southern® cast steel wheel is A.A.R. approved for full interchange service! The 1957 rules of interchange, issued January 1, are modified to cover this A.A.R. acceptance. A new A.A.R. specification, M-208-56, covers purchasing and inspection procedures.

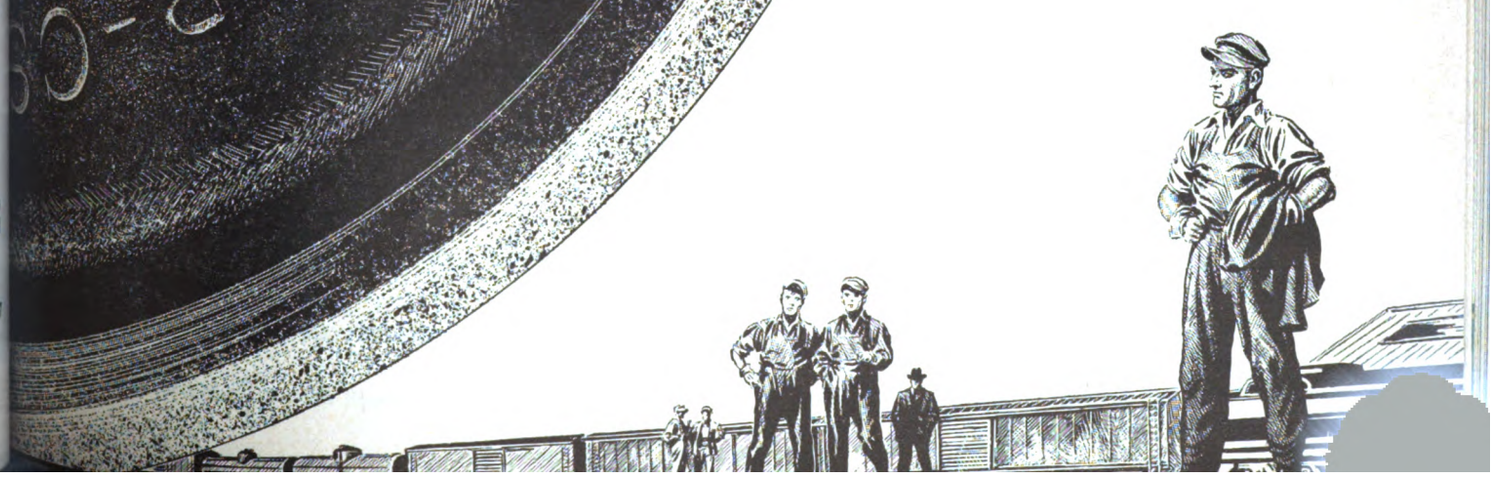
In granting this formal approval, the A.A.R. recognizes the many years of research, the long experience in actual road service, and the hundreds of thousands of miles rolled up by these wheels as produced in our modern, new foundry at Calera, Alabama. Here, today, is truly *the* freight car wheel of tomorrow!

AMERICAN
Brake Shoe
COMPANY

RAILROAD PRODUCTS DIVISION
230 PARK AVENUE, NEW YORK 17, NEW YORK

NEW A. A. R. STANDARD FOR INTERCHANGE SERVICE!

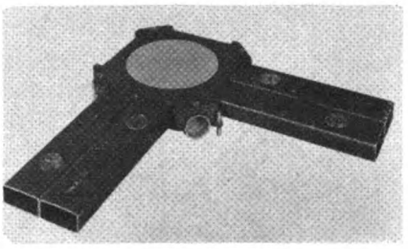




glass-reinforced polyester material molded on the steel frame forms a one-piece unit. This serves as a support for the molded Vinylfoam cushioning, with its contoured surfaces and pin mold cores. It is said to have a favorable compression quality for vehicle seating.

The cushioning portion is heat-sealed to an encasing vinyl skin. These can be snapped on or off as a unit for cleaning or eventual replacement.

These seats are available in any color, including white and in numerous embossed patterns. *Elastomer Chemical Corp., Dept. RLC. 212 Wright Street, Newark 5, N. J.*



Underfloor Wiring

A flush raceway for an underfloor wiring system has been made available. Known as Flushduct, it is used primarily for modernizing existing buildings. It is installed by trenching the existing floor so the ducts can be installed flush with the surface of the floor. Linoleum or other top surface materials are then laid directly over the duct system.

The ducts are furnished in 10 ft lengths, with outlets spaced every 24 in. along the duct and each outlet closed with a brass cover plate. They are available in single duct, two duct and three duct systems. The two and three duct systems are welded together.

Generally, standard elbows and fittings comprise the system components. Specially designed set screws hold the duct firmly in place and maintain positive electrical grounding continuity. *National Electric Products Corporation, Gateway Center, Pittsburgh, Pa.*

Improved
FLEETWELD 47
by LINCOLN

Iron powder electrode for mild steel with AC or DC

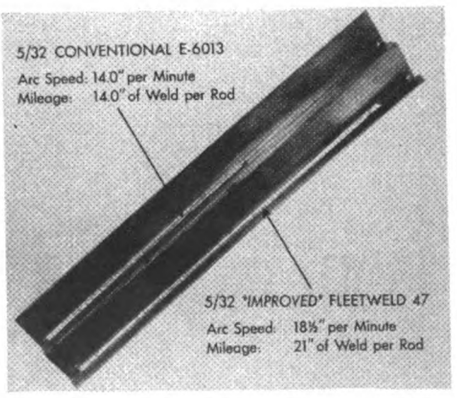
Up to 30% more weld per rod!

cuts welding costs by:

- having one electrode for down-hand and out-of-position work
- easier welding with no tendency to sticking
- higher deposition rate...10% to 30% faster arc speed
- less spatter
- easier slag removal

than conventional E-6013 electrodes.

Send for Specifications and Procedures in Weldirectory SB-1351. Write Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, O. Railroad Representatives of



Upper weld made with one 14" conventional E-6013 electrode in one minute. Bottom weld made with one Improved Fleetweld 47 electrode in 1.13 minutes.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

Lincoln... one dependable source for all your arc welding needs

Heavy Duty Truck

This model 7260-D truck, designed to handle extra heavy loads such as tools, transformers and batteries, is of all-steel construction. Two or three shelf models are offered with an optional drawer. The 20 x 28 in., 14-gage shelves are adjustable and reversible with folded edges for strength and safety. Overall standard height is 32-in.

The truck is available with stationary feet, as well as with hard rubber casters. Baked enamel standard finishes are gray, green, beige or brown. *Toledo Metal Furniture Co., Dept. RLC, Toledo, Ohio.*

Internal Periscope

An instrument called a borescope, similar to the cystoscope used in the medical profession, is now available for examining interior surfaces of cylinders, tanks and also the inside of small bores or holes. It is a long tube with a tiny incandescent lamp and an objective lens in one end, and an eyepiece with ocular lens and erecting prism in the other. Through the length of the tube, which may be only $^{9}/_{100}$ of an inch in diameter, are achromatic intermediate lenses, plus wiring for the lamp.

It can be inserted through openings as

Over 12 process steps are integrated into a single operation at ALCO spring manufacturing facilities. Here hot-wound railroad springs are automatically ejected from furnace after completing heat-treatment process.

ALCO *"PERFORMANCE RATED"* SPRINGS MEET MAXIMUM RAILROAD REQUIREMENTS

Automation Methods Assure Uniform Spring Quality, Precisely Meet AAR Specifications; ALCO Railroad Spring Production Experience Spans 80 Years

Millions of "Performance Rated" Springs from the nation's leading producer –ALCO–are in constant use on railroads around the world. ALCO's pioneering leadership assures reliable, high-quality railroad springs from people who know *more* about spring making.

Uniform spring quality—whether it's 10 or 10,000 springs—is guaranteed by ALCO's modern manufacturing facilities. Many production steps, coordinated into a single operation and carefully controlled electronically, provide spring quality that never varies.

Prompt, economical delivery of your order is made from either of ALCO's ideally situated plants in the East and Midwest. Other factors, such as ALCO's indoor bar stock storage, complete design and testing facilities, provide the best in "Performance Rated" railroad springs.

For further information about ALCO "Performance Rated" Springs—and about ALCOLID, ALCO's superior journal-box lid—call your nearby ALCO Sales Representative or write Spring & Forge Division, Dept. SGR-1, P. O. Box 1065, Schenectady 1, New York.

ALCO

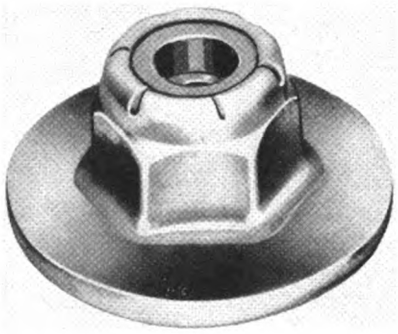
ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Locomotives • Diesel Engines • Nuclear Reactors • Heat Exchangers • Springs • Steel Pipe • Forgings • Weldments • Oil-Field Equipment

small as 1/10 of an inch in diameter to view surfaces up to 20 ft away. Detecting cracks and faults in the inner walls of engine cylinders and valve seats which might cause trouble is a typical example of the use of borescopes. Time-consuming dis-assembly of engines may, in some cases, be eliminated. *National Electric Equipment Company, Dept. RLC, Elmhurst, N. Y.*



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This flanged hexagon self-locking nut, with a large washer-type seat, can be used for fastening applications involving spring tension. The bearing area of the Type 1994 nut is said to eliminate the need of individual nuts and special washers.

During shipment of a spring-mounted unit, the nut can be turned down to make a solid mounting which cannot shift. Upon delivery, the nut is backed off to the proper spring tension. Its base flange, against which the spring seats, is 1 in. in diameter. The nut is steel and is furnished with a plain or plated finish. *Elastic Stop Nut Corporation of America, Dept. RLC Union, N. J.*

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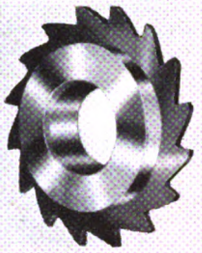

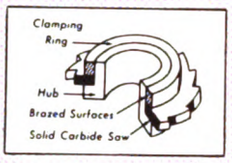

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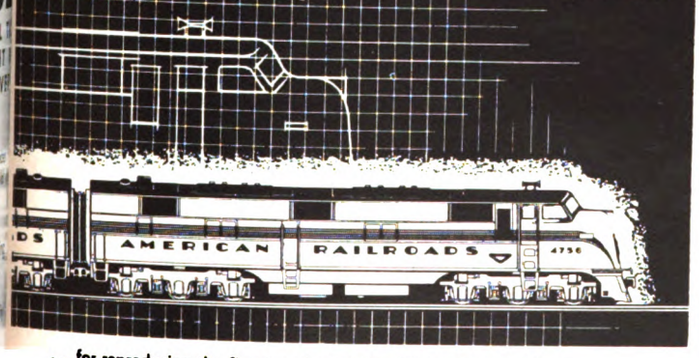

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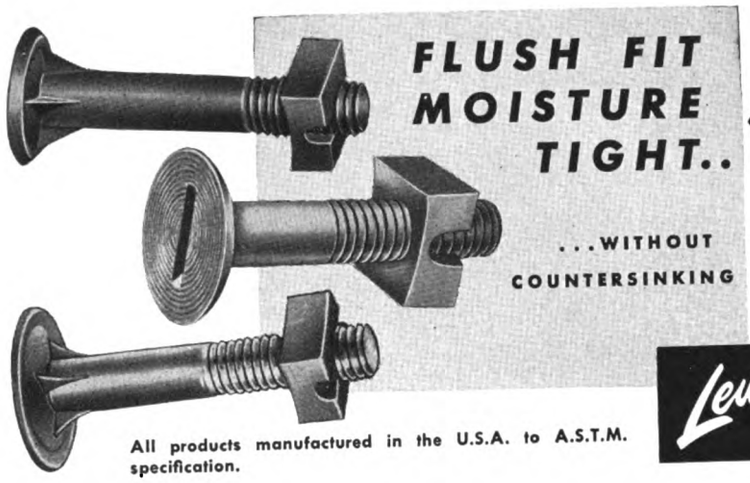

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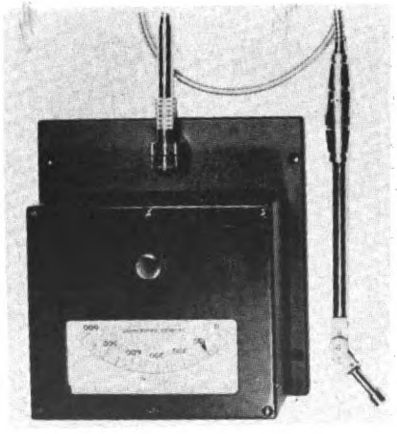

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The heavy-duty welded steel case is magnetically shielded. Gaskets make it dustproof, fumeproof and splashproof. *Illinois Testing Laboratories, Inc., Dept. RLC, 420 N. LaSalle st., Chicago 10.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

STOP RUST. 32-page 1957 coatings manual, Form No. 256, contains information and recommendations for determining specific coatings needed to protect practically any rustable metal surface. Basic principle of Rust-Oleum's fish-oil penetration through rust and into the pores of the metal vividly illustrated. Applications on girders; tanks; water, steam and brine piping, equipment, etc., shown in full color. Chips show range of colors available in primers; fast-drying indoor and outdoor short oil coatings for use where dampness, salt air and spray, fumes, and abrasion are present, and long oil type coatings where normal fumes, smoke, gas, and weather conditions exist. Galvinoleum, heat resistant, chemical resistant, and floor coatings covered separately. (Write: *Rust-Oleum Corp.*, Dept. RLC, 2799 Oakton st., Evanston, Ill.)

WIRE ROPE SLINGS. Catalog A-931 includes information on all purpose slings with tapered sleeve attachments, Roegal cable-laid slings, flatweave slings, railroad slings and special assemblies, fittings, and general information. (Write: *John A. Roebling's Sons Corp.*, Dept. RLC, Trenton 2, N. J.)

SPRINGS FOR INDUSTRY. 16-page bulletin on production of hot- and cold-wound steel springs. Describes Alco's adaption of automation techniques in producing springs. Contains formulas and specifications for helical extension springs and volute and Belleville disc springs, design recommendations and a chart listing physical properties for calculating springs in 22 materials. (Write: *Alco Products, Inc.*, Dept. RLC, P. O. Box 1065, Schenectady, N. Y.)

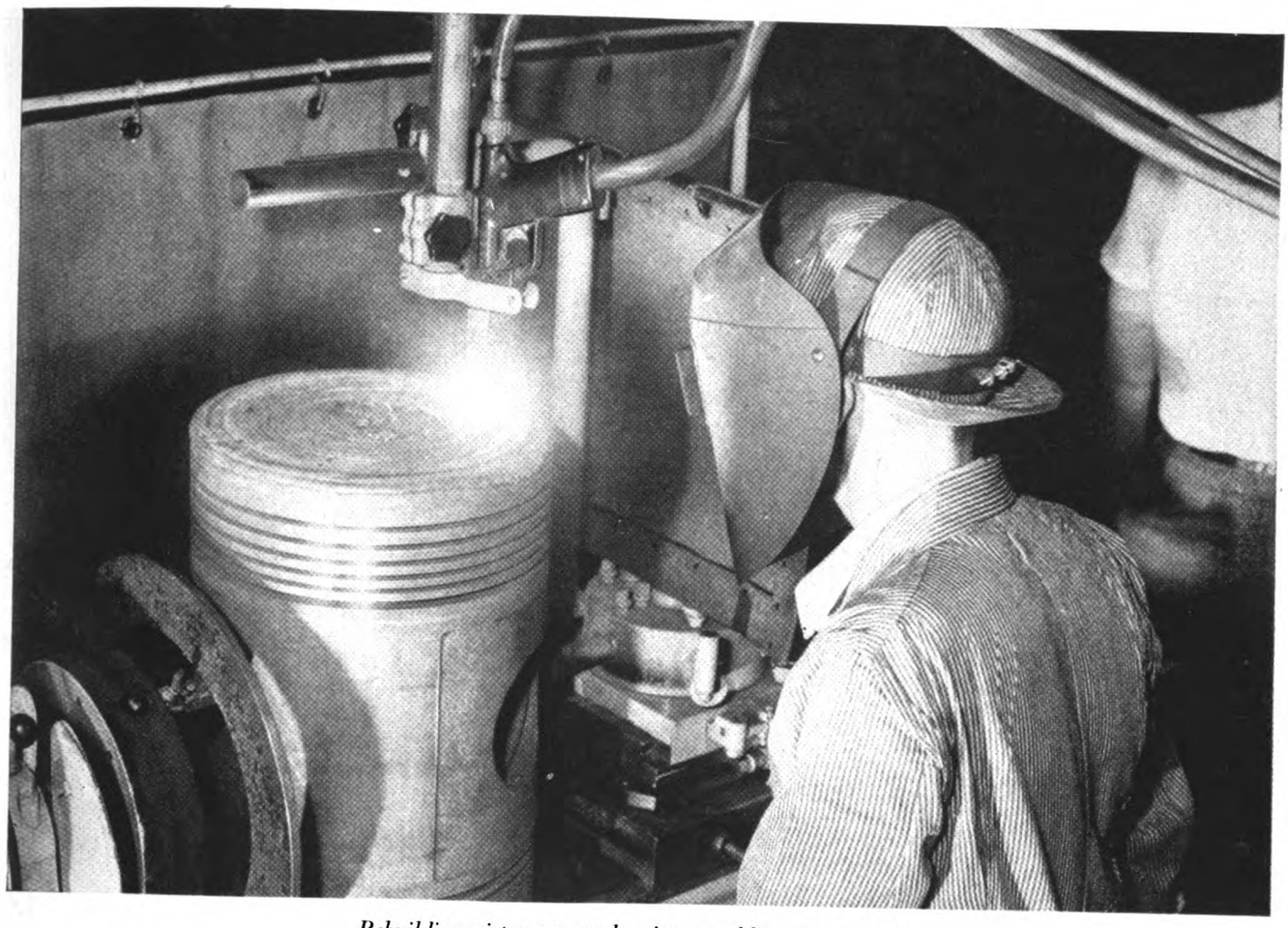
FLAW LOCATION. 4-page folder, "Flaw Location with Turco Dy-Chek," intended to acquaint new personnel with most efficient procedures for performing penetrant inspections and to reacquaint qualified personnel with necessary precautions that must be observed during inspections. (Write: *Turco Products, Inc.*, Dept. RLC, 6135 S. Central ave., Los Angeles 1.)

NUCLEAR SYSTEMS. 8-page booklet briefly describes the radiation facility of the Budd Company's Nuclear Systems Division, its products and services. (Write: *Nuclear Systems, a Division of the Budd Co.*, Dept. RLC, Philadelphia 32.)

CUTTING MACHINES. 4-page Bulletin DH-460-B describes complete line of Campbell abrasive machines both for dry and wet cutting. Contains also specification table and data on Allison abrasive cutting wheels. (Write: *American Chain & Cable Co.*, Dept. RLC, 929 Connecticut ave., Bridgeport 2, Conn.)

STUD WELDING. 36-page booklet on industry standards in arc-welding studs, pins and tapped pads for stud welding contains a complete index and reference to equipment and accessories. Lists size minimums and maximums and details mechanical properties, chemistry, thread sizes, plating and annealing information and other data for engineers, production and purchasing men. (Write: *K S M Products, Inc.*, Dept. RLC, Merchantville 8, N. J.)

BATTERIES. Bulletin DL-577/54 covers complete line of Slyver-Clad lead-calcium and lead-antimony batteries for railroad diesel starting applications. Specifications include data on battery ratings and capacities, details of design and construction, dimensions and weights, also comparison data. (Write: *C & D Batteries, Inc.*, Dept. RLC, Conshohocken, Pa.)



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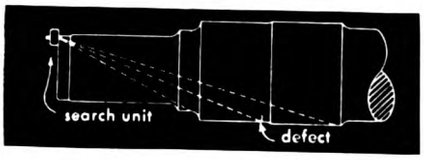
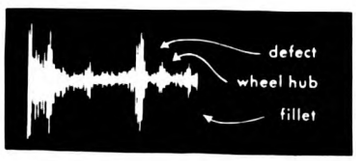
Sawed axle showing crack in dust guard fillet area found with Reflectoscope.

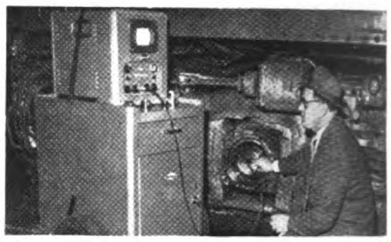
Axle section showing wheel seat defect revealed by Reflectoscope inspection.





A narrow beam of high frequency sound penetrates the test axle and is reflected from any defect in its path—immediately and accurately picturing the defect on the Reflectoscope Cathode Ray Tube. The Reflectoscope picture above shows an axle defect. The drawing of the axle shows the defect—just where the Reflectoscope indicated it would be.

Locating internal flaws before they cause failures is positive "low-premium" insurance against costly derailments... Reflectoscope inspection is the most accurate, economical method of locating defects. Ask your Sperry Sales Engineer to show you how the Reflectoscope fits into your maintenance program. Send for detailed information.



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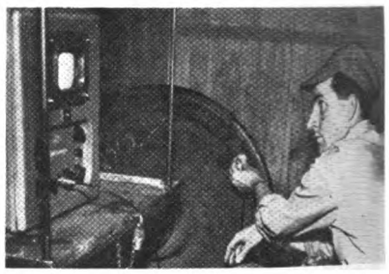

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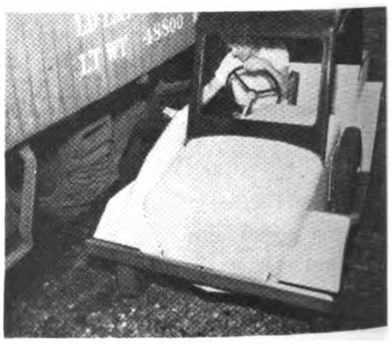
Reflectoscope inspects for internal defects at point of manufacture and at point of service.



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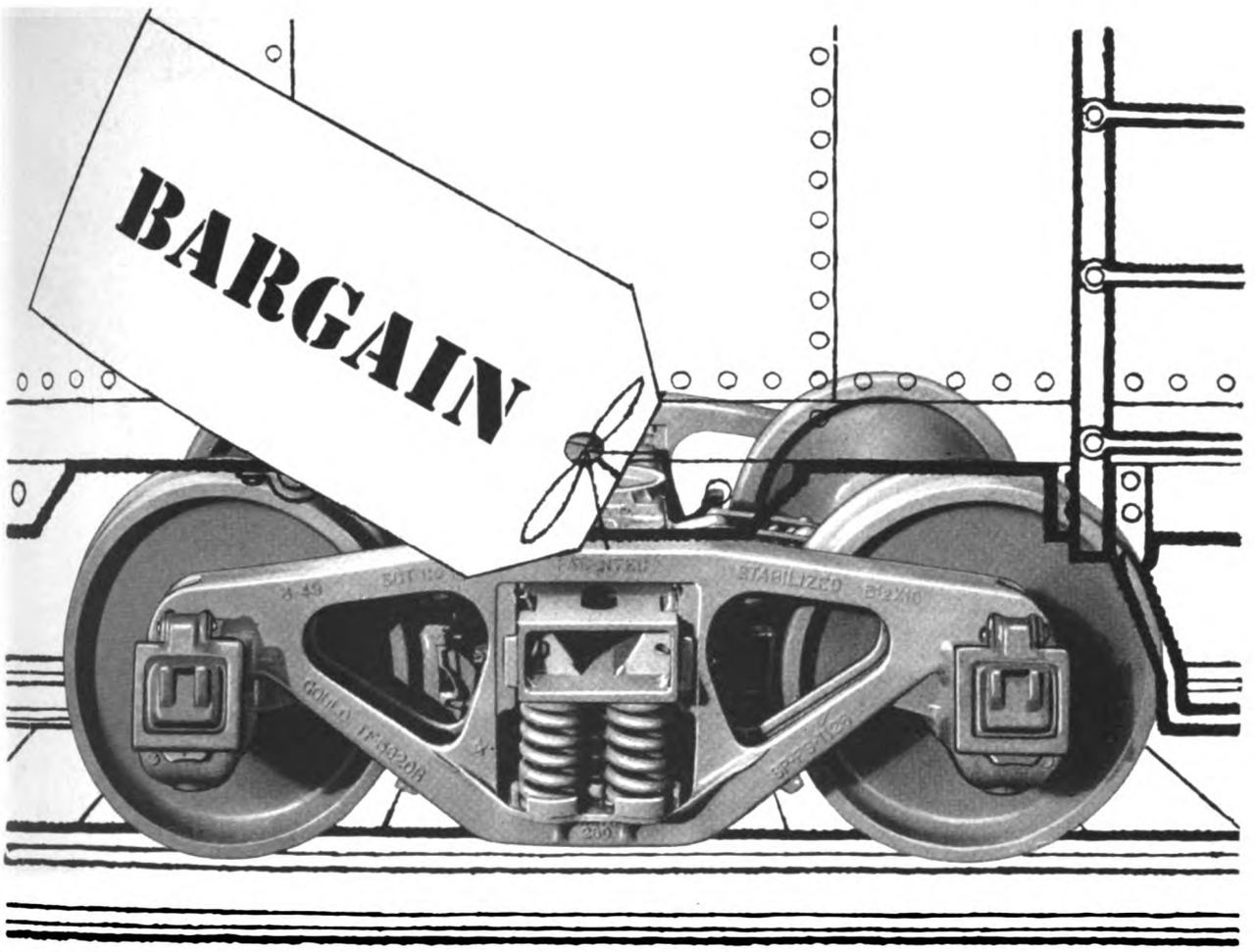

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Proved Protection — Approved by Locomotive Builders

Nalco TREATMENT Protects Diesel Cooling Systems Against Scale and Corrosion

Users Choice of Liquid, Pellet or Pulverized Form

Important to your diesel engine availability! Cooling systems can't help but scale and corrode without adequate chemical protection.

Nalco has the effective and economical treatment you want... whether you prefer liquid, pellet, or pulverized form. Chromate as well as non-chromate type treatments are available.

Use these proved *Nalco* non-foaming treatments with complete safety... they provide outstanding metal protection without damage to any of the non-metallic parts—like gaskets or hose—in the cooling system.

Complete details sent promptly upon request. Call your *Nalco* Representative, or write direct.

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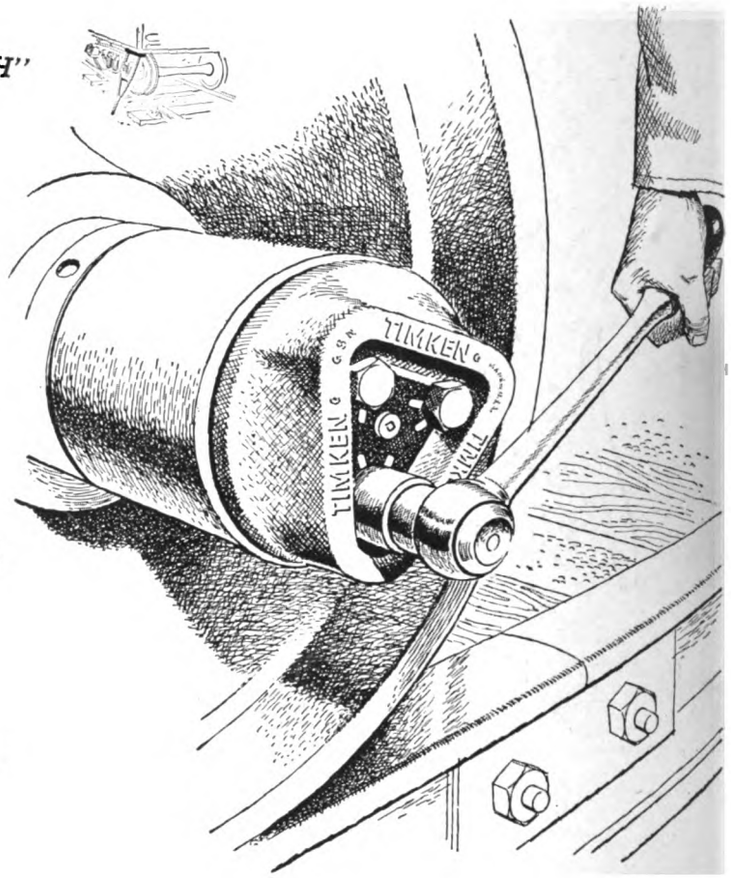
Nalco®

PRODUCTS . . . Serving the Railroads through Practical Applied Science

YOU CAN'T CURE WITH A "CRUTCH"

The one sure Cure for the Hot Box Problem: Timken® Bearings

...and they pay for themselves over and over and over in operating and maintenance savings



USE of "crutches"—devices attempting to improve friction bearing performance—will never answer the hot box problem. The one sure *cure* is Timken® tapered roller bearings, because they eliminate the *cause* of hot boxes—the friction bearing itself.

EXTRA SAVINGS, TOO With Timken bearings, you also slash the cost of bearing inspection and lubrication. Costs that hang on even with crutch devices. Timken bearings cut terminal bearing inspection time by 90%, reduce lubricant costs as much as 95%. The fact is, the new Timken heavy-duty type AP (All-Purpose) bearing assembly can go three years without the addition of lubricant. When all railroads go "Roller Freight", they'll save an estimated $224 million a year, earn about a 22% net annual return on the investment.

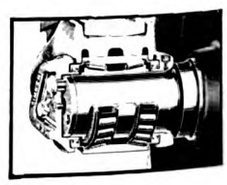
THE TAPER DOES IT Doing away with the hot box problem is a simple job for Timken bearings. They roll the load instead of sliding it. There's no metal-to-metal sliding friction as with friction bearings. And the tapered design makes Timken the only roller bearing you can *be sure* will *cure* the hot box problem *and* reduce operating and maintenance costs to the lowest possible point. The taper in Timken bearings prevents lateral movement. There's no pumping action—less lubricant is required. There's no scuffing or skewing—bearings last longer.

And to be sure of the quality of Timken bearings from melt shop to final bearing inspection, we make our own steel. We're America's only bearing manufacturer that does.

PRACTICAL CONVERSION PLAN USED Figuring in the extra cost of buying and maintaining "crutch" devices that don't cure, it's easily seen that the difference in price between friction and roller bearings is smaller today than ever. And now a program adopted by one major American railroad promises an even greater reduction. This railroad has put into effect a practical program for converting to "Roller Freight". It works like this. Every freight car coming into the shops for major repairs is converted to roller bearings. This simple, workable plan 1) facilitates a steady shop and labor schedule, keeping installation costs to a minimum, 2) allows the railroad to absorb the cost for its conversion to roller bearings over a period of years.

Instead of trying to shore up friction bearings with costly "crutches", *cure* the hot box problem and gain maximum savings in operating and maintenance costs with Timken bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

Only TIMKEN® bearings cure the hot box problem and cut operating and maintenance cost to a minimum



Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

MARCH 1957

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WITH INEXHAUSTIBLE ENDURANCE

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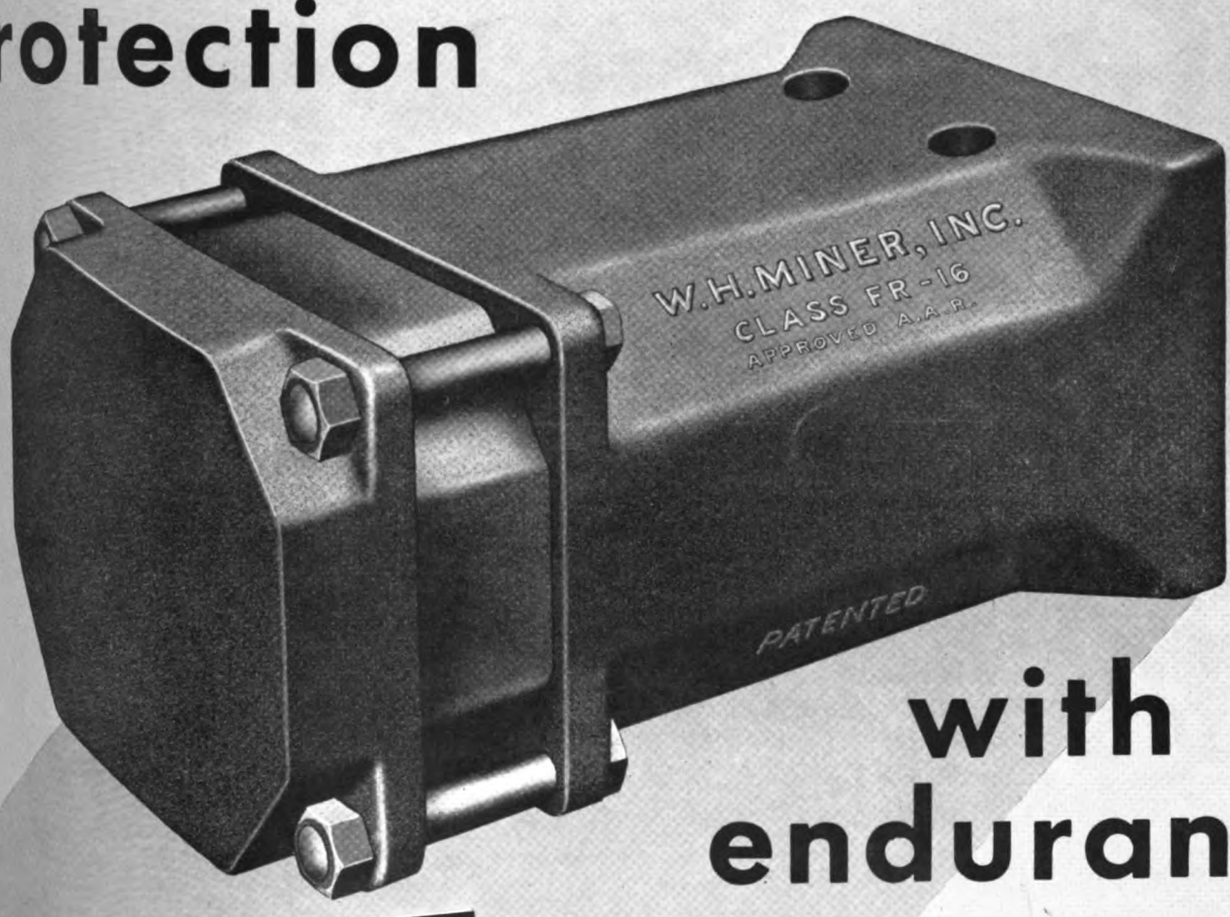

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CHICAGO

SIMPLIFY YOUR LUBRICATION

NOW, with *Texaco Multifak,* you can handle virtually all your grease lubrication jobs with *just one* product. This fine multi-purpose grease assures effective lubrication of ball, roller and sleeve-type bearings—all parts, in fact, where grease is required. It reduces the chance of lubrication errors, saves time and money.

Texaco Multifak is an outstanding lithium-base grease that pumps easily at low temperatures and lubricates effectively even at temperatures up to 250°F. or more. *Texaco Multifak* has great oxidation resistance, high stability and resists water.

Let Texaco Systematic Engineering Service—available in all 48 States—help you keep your machinery operating efficiently and your costs for maintenance low. Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta.

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

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TEXACO Railroad Lubricants

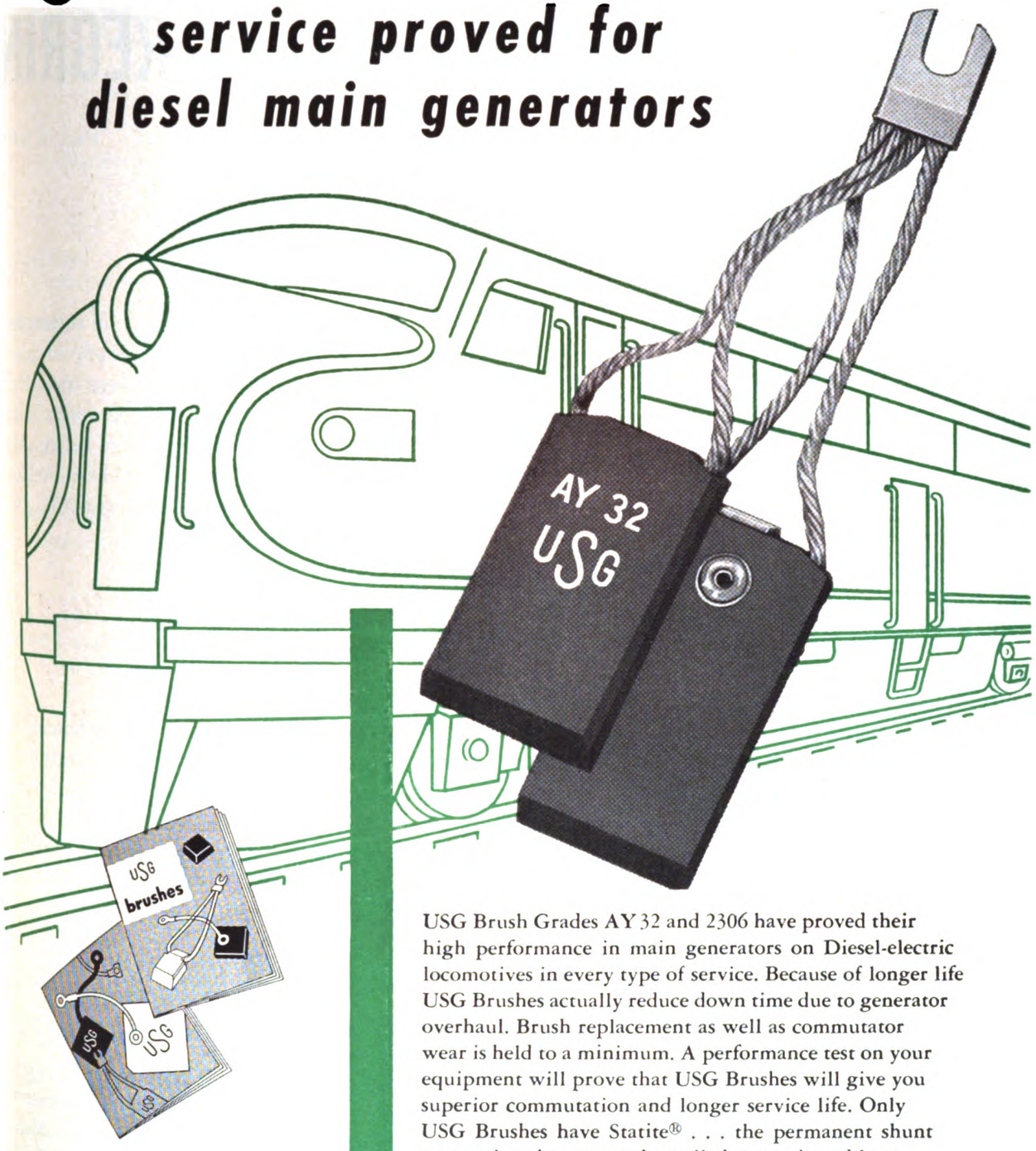
AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

TUNE IN . . . METROPOLITAN OPERA RADIO BROADCASTS EVERY SATURDAY AFTERNOON

USG® BRUSH GRADES AY 32 AND 2306

service proved for diesel main generators



USG Brush Grades AY 32 and 2306 have proved their high performance in main generators on Diesel-electric locomotives in every type of service. Because of longer life USG Brushes actually reduce down time due to generator overhaul. Brush replacement as well as commutator wear is held to a minimum. A performance test on your equipment will prove that USG Brushes will give you superior commutation and longer service life. Only USG Brushes have Statite® . . . the permanent shunt connection that cannot be pulled out or jarred loose. Statite retains its original low millivolt shunt drop. Now's the time to try USG Brush Grades AY 32 and 2306 with Statite connections that have never failed in millions of miles of railroad service! Why not order today?

Send for the latest USG Brush Catalog B-56 and the new USG Brush Grade List, both are excellent for designing or for specific applications.

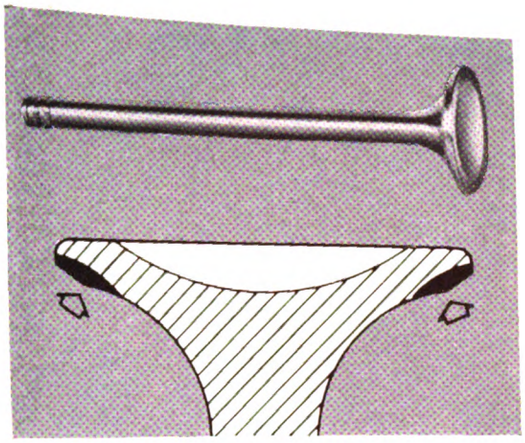
223

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW 13, MICHIGAN

ectro-Motive Parts Progress

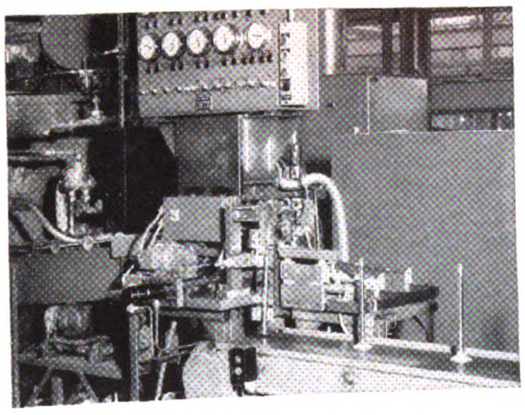
THIS EXHAUST VALVE AVERAGES TWO YEARS SERVICE BEFORE REGRIND



Reasons:

1 *Engine's choice*

Experience has taught us that an engine dictates its own valve needs. Our Model 567 Diesel proved this when previous valve designs of other engines were tried. Exhaustive testing produced the valve shown here, which in normal passenger or freight service runs two years before seat and face regrind. Cutaway view shows special hard Stellite face on valves dictated by our higher horsepower 567C Diesel.



2 *Exclusive manufacture and inspection process*

Manufactured almost entirely by automatic machines, Electro-Motive valves are held to extremely close tolerances. Guarding this precision is a battery of automatic and visual "in-process" inspection controls that assure constant quality and absolute machining accuracy. An example is this electronic machine which checks 14 tolerances at one time on every valve.

3 *Protective packaging*

This special package is used to protect the finely machined surfaces of the valve during handling. Each valve is fitted snugly and protected against moisture with rust preventative V.P.I. paper. Packing like this keeps the valve in perfect condition, always ready for immediate use, and far easier to handle and store.

Continuing improvement is an unending program at Electro-Motive to bring you products of highest quality at lowest cost. When you buy General Motors Diesel parts you get components that are designed, engineered and built to work together. In addition, you benefit with a full warranty and convenient, fast delivery from nine strategically located Electro-Motive warehouses.

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ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

MARCH, 1957 VOLUME 131, No. 3

MOTIVE POWER AND CAR

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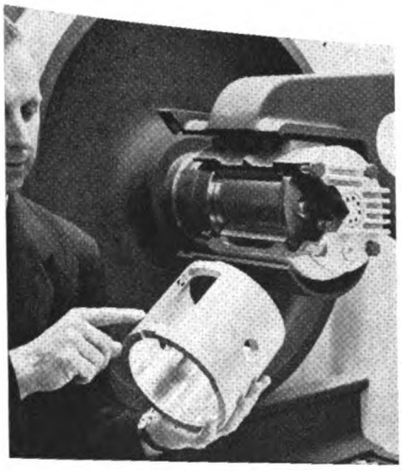
NEXT MONTH:

Roll Them Out Like New:
(Second Installment)

Dismantling and Shipping



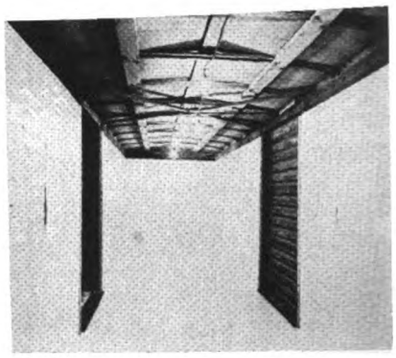
Sleeve-Type Journal Bearing

The Kar-Go, a sealed sleeve-type axle bearing, has been developed for freight cars. It consists of a hardened axle sleeve, an aluminum alloy bearing, and a felt wick lubricator assembly, all contained in a housing that fits into the standard journal box with minor alterations, or into narrow or wide-jawed pedestal-type truck side frames. Entrance of foreign material and loss of lubricating oil are virtually eliminated because all the parts within the unit are sealed.

Kar-Go bearing has been successfully tested by 10 American and Canadian railroads which have now accumulated more than five million unit miles. Eighteen more are ready to start test programs. Pilot production is now underway to fill these service test orders. Kar-Go bearing development began in 1952. In 1955 the new bearing successfully completed initial laboratory testing.

It has an automotive-type oil seal constructed of synthetic rubber. The unit holds only one pint of oil which, according to extensive tests, is enough to properly lubricate it. Spring-loaded felt wick lubricators are fixed at the bottom of the bearing unit and maintain positive contact with the journal sleeve which fits over the axle.

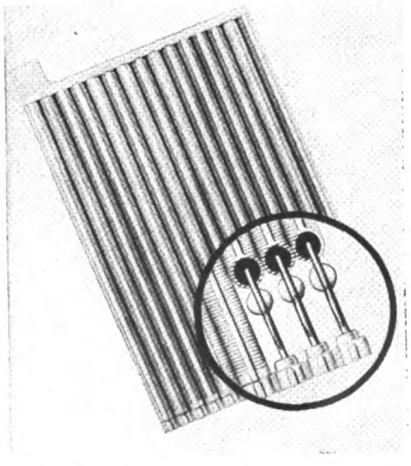
The precision design and accurate control of the clearance are said to increase bearing load capacity and cooling. Bearings are available for journals from 5x9 in. to 6½x12 in. *Allison Division, Dept. RLC, General Motors Corp., Indianapolis.*

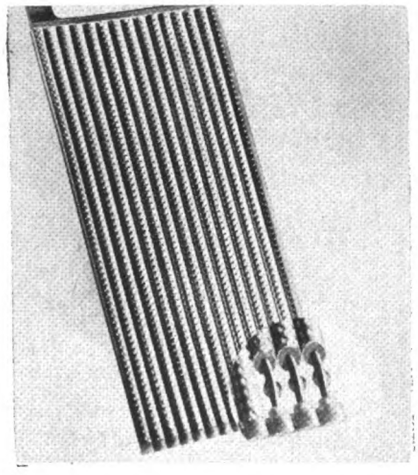


Box Car Liner

Conolite, a laminate of polyester resin and glass cloth has been developed to protect box-car walls from wear and impact, eliminate dust, and to seal off existing dirt traps.

This lining is described as a glossy, non-porous surface, preventing staining and penetration by oils, solvents or organic materials. It is said to be easily cleaned, retaining no odors, and needs no special skill or preparation to apply. *Continental Can Co., Conolite Div., Dept. RLC, 205 W. 14 st., Wilmington 99, Del.*





A positive grid with slotted tubes is shown at the left, and a new type with armored porous tubing at the right.

Battery Capacities Increased 20 Per Cent

A new type of Exide-Ironclad positive plate for lead storage batteries has resulted in a battery of increased capacity in a given space. It will apparently also extend battery life. In the new positive plate, the slotted tubes which retain the active material in contact with the central Silvium grid spines are replaced with a new type of retainer. The new retainer consists of a perforated polyethylene tube inside of which there is a second tube of woven glass fiber. The two tubes allow for free passage of electrolyte and also retain active material firmly in place. The combined thickness of the plastic and woven glass tubes is less than that of the slotted tube and allows for an increase of active material in a tube having the same outside diameter. Also, since the material is better contained, it has been possible to reduce sediment space and increase plate length accordingly. Space above the plates has not been changed.

As a result, battery amp-hr capacity, at the 6-hr rate, has been increased 20 per cent, and watt-hr capacity 21 per cent without increasing the external battery dimensions. At the one-hr rate, watt-hr capacity has been increased 35 per cent. Conversely battery size may be reduced without reduction of capacity. Weight is up 6 per cent for batteries of equal size and 20 per cent more capacity.

Because of these characteristics, the battery is designated as a motive power battery Type TG Exide-Ironclad Giant for the operation of industrial trucks. It has a rated capacity of 72 amp-hr per positive plate as compared with 50 amp-hr for the type TLM and 60 amp-hr for the TH type. *Exide Industrial Division, The Electric Storage Battery Company, Dept. RLC, Box 8109, Philadelphia 1, Pa.*

Compressed Air Filter

A combined unit for the automatic filtration, regulation and lubrication of air supply to pneumatically operated equipment is available in ¼, ⅜ and ½-in. sizes.

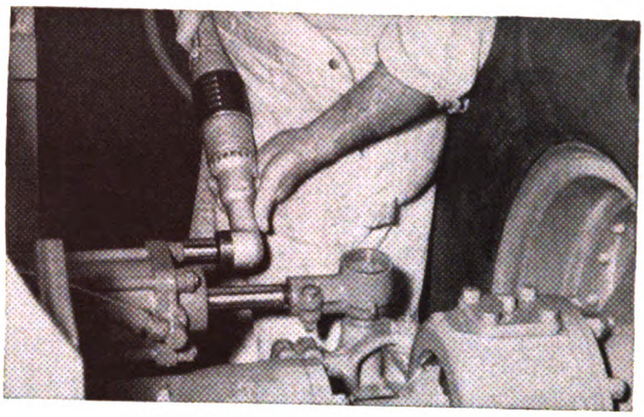
"Tornado" action, which imparts a downward spiral motion to the incoming air, throws foreign particles and condensation against the sides of the filter bowl for accumulation and drain-off. Cleaned of larger particles and condensation, the air then passes through the passages of the bronze filter element for final

Now! Four complete lines!

Thor right angle air tools

Capacity range—No. 12 to ¾" nuts

NEW NO. 4 SERIES SPECIALLY DESIGNED FOR HEAVY DUTY



HEAVY DUTY WORK

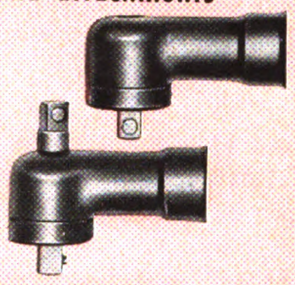
Thor's newest entry in the direct drive right angle air tool field is the No. 4 heavy duty series. All new, the No. 4 series offers extra power, light weight and long trouble-free life.

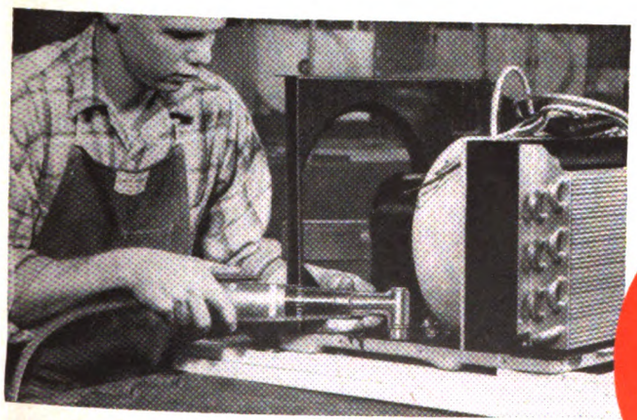
LIGHT DUTY WORK

Lightweight Thor No. 2 series right angle air nut setter makes this assembly job quick, sure and easy on the operator. No. 2 series includes tools up to ¼" capacity—and is available with an offset or lever throttle. Also a wide range of accessories.

All Thor right angle nut setters available in single or double end attachments

You can apply nuts or remove them with any of the tools in the Thor No. 2, 3, 4, and 5 series. Equipped with double end attachments, one end applies nuts—the other removes them.





CLOSE-QUARTER WORK

Getting at those hard-to-work areas is no problem for this Thor right angle nut setter. This tool is from the Thor No. 3 series which includes nut setters up to 5/16" capacity. All Thor nut setters and screwdrivers have built-in air regulators.

Thor PORTABLE POWER TOOLS

Thor's flexibility goes even further. All four right angle tool series, in single and double end, offer a heavy duty attachment and a close quarter attachment—plus a complete range of speeds in all sizes and types. Thor has right angle air tools which can be adapted to most any application involving threaded fasteners. Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

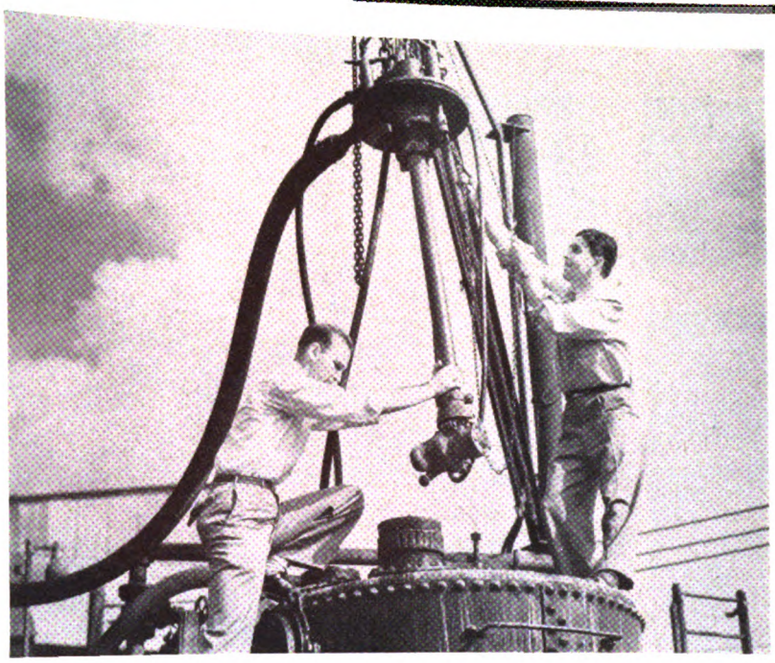
THOR POWER TOOL COMPANY, Chicago

Branches in all principal cities

In tank car cleaning, too

Oakite gives you

low-cost end results



Using the *correct* cleaning *method* is just as important as using the *correct* cleaning *compound* when it comes to cutting maintenance *cleaning costs*. Take these typical examples:

One railroad had to spend over $5200 to clean 135 tank cars manually (not to mention the hard work involved). But when they mechanized the job with the Oakite 324 Cleaning Unit, they got black and white proof of better results. The method eliminated laborious scrubbing, hastened turnaround, cut consumption of materials by two-thirds, saved $1600.

The Oakite Fogging Unit is another such improver of end-results. Applying an efficient mist of Oakite soil-loosening detergents, it has done an "impossible" *rush job* of cleaning out a tallow encrusted car in only 6 hours . . . the *thorough* removal of asphaltic deposits in just 5 hours.

It's *end-results* that count most on the cost sheet. And that's why so many leading roads count on Oakite materials, methods and equipment for low-cost cleaning. Booklet F-8055 describes these in detail. Write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

gives you the important advantage . . .
LOW-COST END RESULTS

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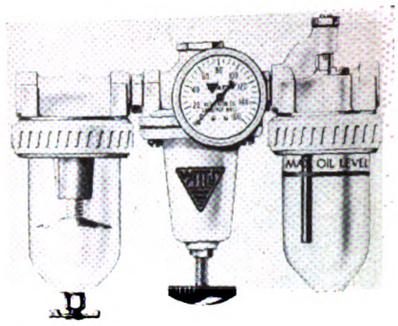
RAILROAD DIVISION

EQUIPMENT

(Continued from page 6)



filtering before entering the regulator. Screwed-ring design permits removal of filter bowl without the use of tools.

The unit also features an "aspirator." This allows instant compensation of the reduced pressure under conditions of sudden, or widely varying flow demands.

Lubricator portion is designed with a high-velocity venturi action to provide vaporization and assimilation of the metered oil. Reported exclusive, an internal by-pass which parallels the venturi provides practically a uniform pressure drop, even under widely fluctuating flow conditions. Lubricator also has hand-tight instant removal features. *Watts Regulator Co., Industrial Div., Dept. RLC, Lawrence, Mass.*

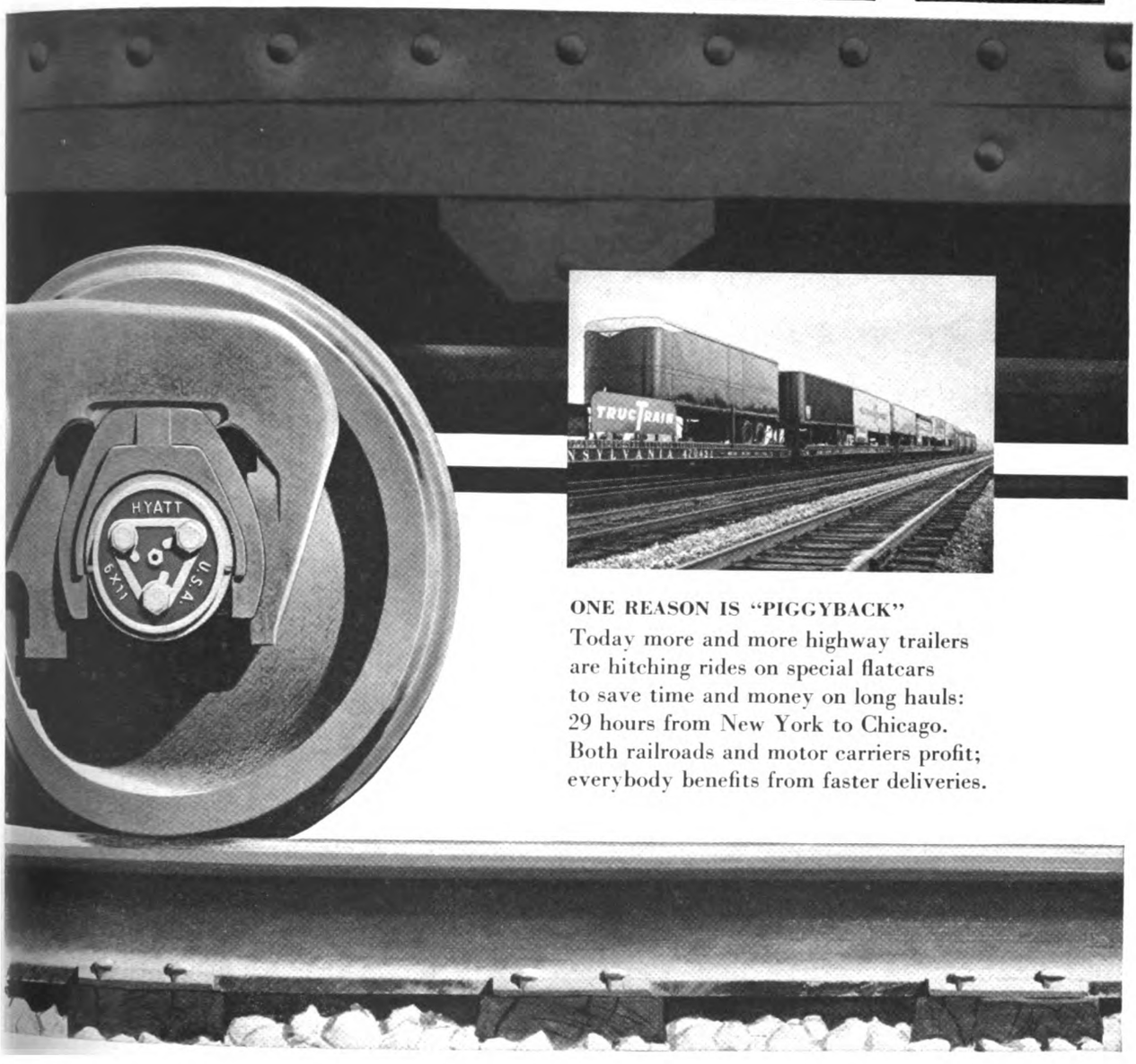
Self-Activated Marker Light

Commercial high brightness safety signals and markers utilizing radioactive Krypton 85 have just been announced. The signals and markers which are designed for installations where power and maintenance are limited, employ treated phosphor crystals excited to luminescence by Kr 85. Units are available in a variety of shapes, sizes and brightnesses.

In clear weather, the lights are readily visible at distances in excess of 500 yards. Colors available include blue, green, yellow, pale orange and orange-red.

Sources are enclosed in hermetically-

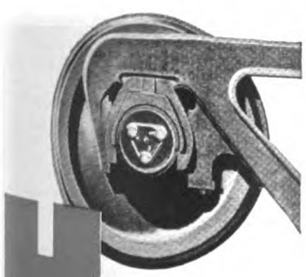
Why rail freight is going great!



ONE REASON IS "PIGGYBACK"
Today more and more highway trailers are hitching rides on special flatcars to save time and money on long hauls: 29 hours from New York to Chicago. Both railroads and motor carriers profit; everybody benefits from faster deliveries.

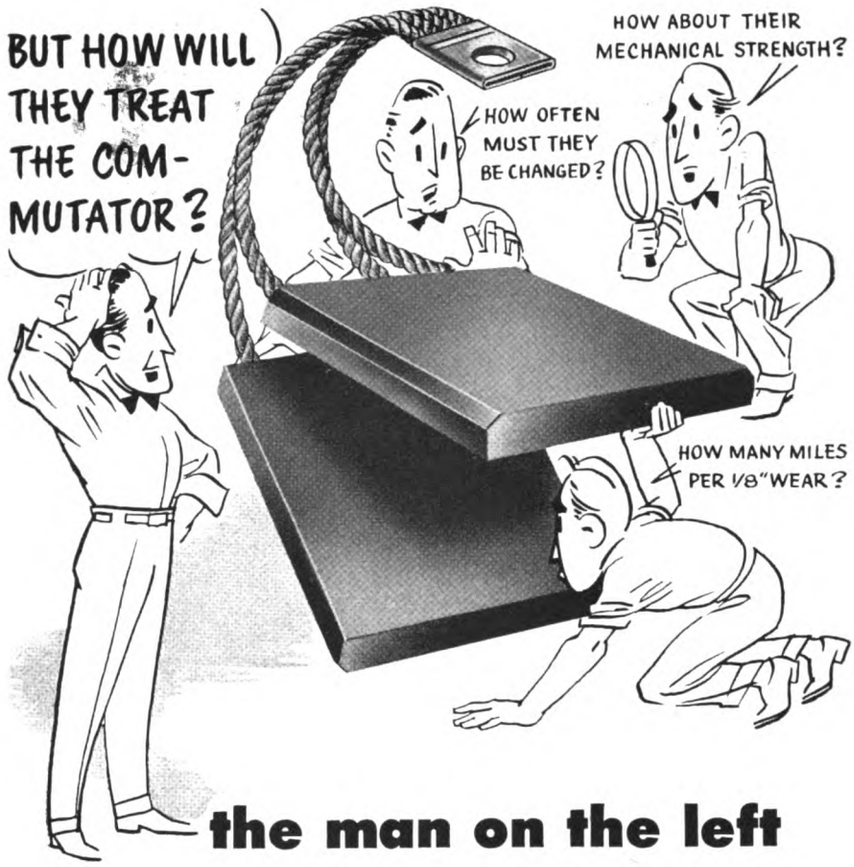
Another GM GENERAL MOTORS contribution to railroad progress

ONE MORE BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. It's significant that so many of the new flatcars built for high-speed "piggyback" service have HYATTS . . . because railroads recognize roller bearings are the answer where delay-free dependability counts! HYATT Hy-Rolls banish hotboxes, major cause of freight train delays. Their sealed-in 3-year grease supply saves time-wasting waits for inspection and lubrication, too. And new HYATT Hy-Rolls are so simple to install and maintain that they make the big switch to roller bearings practical at last. They're playing a bigger and bigger part in the railroads' modernization program to bring America *better and better freight service!* Hyatt Bearings Division of General Motors Corporation, Harrison, New Jersey.



Watch "WIDE WIDE WORLD" Sundays on NBC-TV

HYATT Hy-ROLL BEARINGS
FOR NON-STOP FREIGHT



the man on the left is R-I-G-H-T!

Any way you look at diesel-electric brushes this conclusion must invariably be reached . . .

The best, most economical grades for any given equipment are those that keep the commutators in the best condition under all operating conditions and over the longest mileage schedules.

Brush life is important, too . . . but, in the Stackpole "book", commutators and commutation come first . . . and for primary economic reasons.

Motor brushes, for instance, cost only about $12 a set.

Conservatively estimated, reconditioning a motor commutator costs around $400 . . . and perhaps more if it has been badly bar burned by brushes that had only long life to recommend them.

STACKPOLE

***Diesel Electric* BRUSHES**

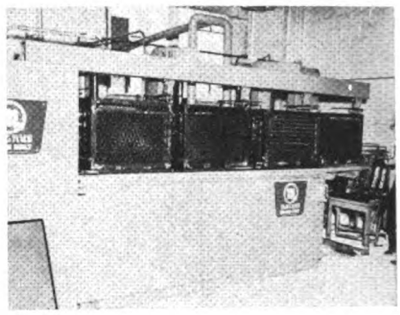
STACKPOLE CARBON COMPANY, *ST. MARYS, PA.*

BRUSHES for all rotating electrical equipment • ELECTRICAL CONTACTS • CATHODIC PROTECTION ANODES • CHEMICAL ANODES • VOLTAGE REGULATOR DISCS • BEARINGS • WELDING CARBONS • MOLDS & DIES • SEAL RINGS • FRICTION SEGMENTS • ELECTRIC FURNACE HEATING ELEMENTS • CLUTCH RINGS • and other carbon, graphite, metal powder specialties.

EQUIPMENT

(Continued from page 8)

sealed, transparent capsules which are weather and tamper-proof, requiring no maintenance. The useful life expectancy is 10 years or more. *U. S. Radium Corporation, Dept. RLC, Morristown, N. J.*

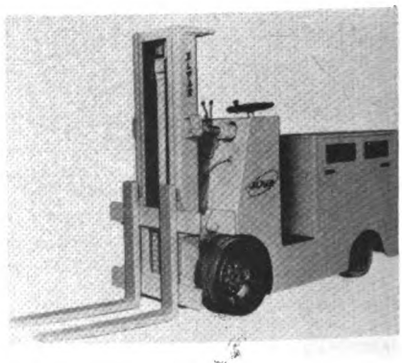


Filter Cleaner

The Magnus Automatic Filter Dip is a machine to wash, rinse, oil and dry diesel locomotive air filters. This method handles filters by batches, using the full immersion method in the cleaning solution, rinse and oiling bath. Filters are agitated up and down in the solutions to speed up the cleaning and rinsing action.

Manual labor is restricted to loading and unloading the baskets. Filters are automatically moved from loading platform to cleaning tank, after they are transferred to the rinse tank by a conveyor, continuing the up and down agitation in the hot-water rinse. They are then immersed in the oil bath to insure a proper coating.

Automation takes the coated filters to a two-stage dryer and then returns them to their starting location. The machine permits one-man operation from one point, and processes 80 to 96 filters, flat or round, per hour. *Magnus Chemical Co., Inc., Dept. RLC, Garwood, N. J.*



Large Capacity Fork Truck

A 6,000-lb capacity heavy-duty fork truck, just made available, incorporates a number of operating advantages. It provides for ease of mounting and demounting, where operators must leave the

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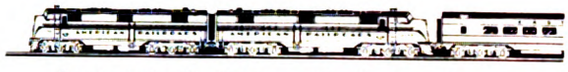

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

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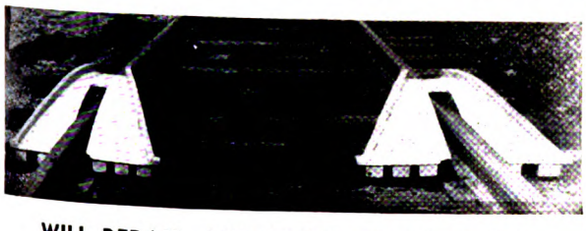
NOLAN RERAILERS



WILL RERAIL ANY TYPE OR SIZE OF LOCOMOTIVE OR CAR IN RECORD TIME!

Thousands in use by railroad operators all over the world. Recommended by Safety Inspectors and Engineers. Built of special alloy heat-treated steel for rugged service. Nolan Rerailers are used in pairs, and will retrack wheels from either or both sides of rail at same time. Each Rerailer straddles the rail, with the narrow end on top of the rail. The derailed wheel comes up the gradual slope, and is forced back on to the rail by the guiding grooves and ridges. Can be used anywhere on the track.

Size of Rerailer	*For Use on Rails as Follows*	*Locomotive or Car Capacity*
No. 2	16 lbs. to 40 lbs.	10 tons
No. 3	30 lbs. to 60 lbs.	15 tons
No. 3½	40 lbs. to 70 lbs.	20 tons
No. 4	50 lbs. to 75 lbs.	40 tons
No. 5	70 lbs. to 100 lbs.	100 tons
No. 5½	85 lbs. to 133 lbs.	200 tons
No. 5¾	85 lbs. to 155 lbs	300 tons

F.O.B. Bowerston, Ohio

Send Order Now! Immediate Delivery. Complete Satisfaction Guaranteed. Free Descriptive Literature.

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BOWERSTON, OHIO

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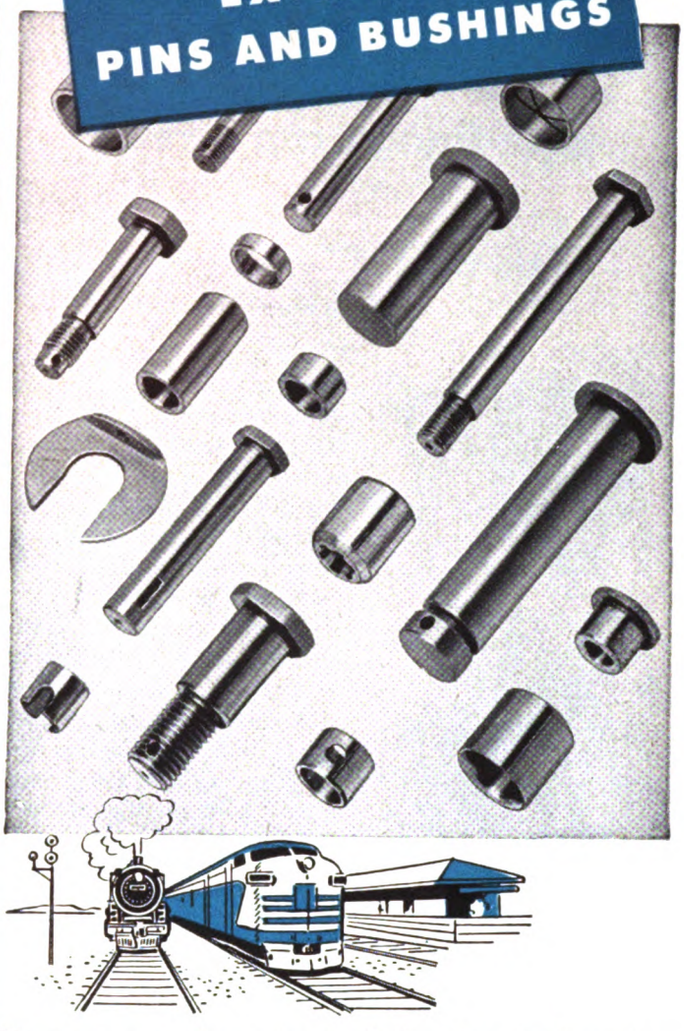
EX-CELL-O PINS AND BUSHINGS



Keep your equipment out of the shop and on the rails with Ex-Cell-O steel pins and bushings. They give from four to six times longer service than ordinary pins and bushings. The tough ductile core of Ex-Cell-O pins and bushings withstands shocks, vibration; their hard case and fine finish resist abrasive action.

52-29

Standard styles and sizes of Ex-Cell-O pins and bushings for steam, Diesel, and passenger car equipment are given in the new Ex-Cell-O Bulletin 32559. Write today for your copy.

RAILROAD DIVISION

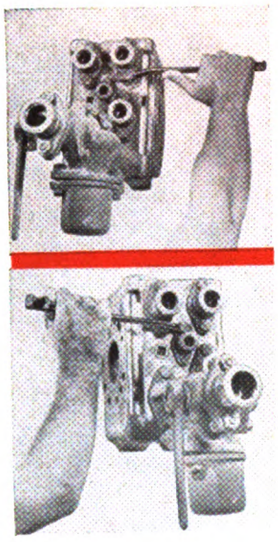
EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

N-6142
special wrench for
pipe flange cap screws
to pipe bracket

Now...

REACH · GRIP · TURN
pipe flange cap screws
FAST · SAFE · EASILY
with this Snap-on* Wrench



Here's a new, special *Snap-on* tool made to work where the closeness of cap screws to the sides of pipe flanges makes it almost impossible to use an ordinary wrench.

Built slim, the N-6142 wrench fits into these tight spots to turn the least accessible of the pipe flange cap screws. Snug and firm-fitting, it adds speed and safety to an otherwise time-taking, awkward job whether attaching or removing the pipe connections.

Wrench openings are 9/16-in. and 3/4-in. with the sides cut away to permit swinging the wrench enough to get a new hold on the cap screw. The double-broached openings will take a new "bite" with only a 30-degree turn.

Snap-on AB Brake Maintenance Kit

All the tools needed to dismantle and assemble brake cylinders or remove and apply AB valves and triple valves. Use the *Snap-on* AB kit for brake work efficiency that only these specially selected tools provide.

Check on many other special *Snap-on* railroad tools and kits that keep costs down, rolling stock "on the move." Write for the *Snap-on* railroad division catalog of special and standard tools.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
28th Avenue • Kenosha, Wisconsin

8130-C

EQUIPMENT

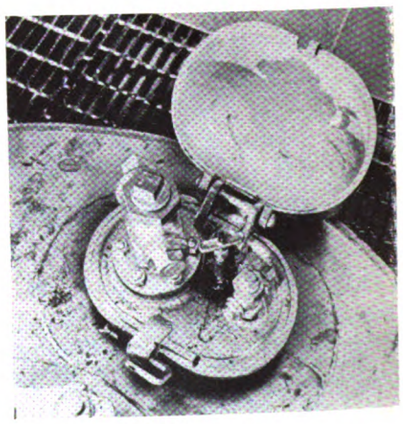
(Continued from page 10)

truck frequently. An unobstructed operator's compartment permits mounting from either side, which is a safety feature. The operator has the advantage of good visibility even when large loads are handled.

Hydraulic lift and tilt provide fast operation. Brakes are hydraulic. The truck frame is of heavy gage reinforced formed steel plates electrically welded into a rigid box structure. Uprights are of alloy steel, hot pressed channels, with the inner uprights and elevator on widely spaced rollers.

Travel speed is 5.5 mph without load and 5 mph with full load. Hoist speed. with full load, is 20 fpm up, 40 fpm down; without load, 40 fpm up, 36 fpm down. The four-speed control is magnetic with time delay between speeds. Deadman control is also included.

The drive unit consists of a motor vertically mounted and directly connected through a free coasting worm gear in first reduction and spur gear in second reduction. Drive shafts are mounted on taper roller bearings and are splined to a four-pinion differential. Wheels are connected to drive shafts through forged clutch plates which are doweled and bolted to the cast steel wheels and splined to the drive shaft. *Elwell-Parker Electric Company, Dept. RLC, 4205 St. Clair ave., Cleveland 3, Ohio.*



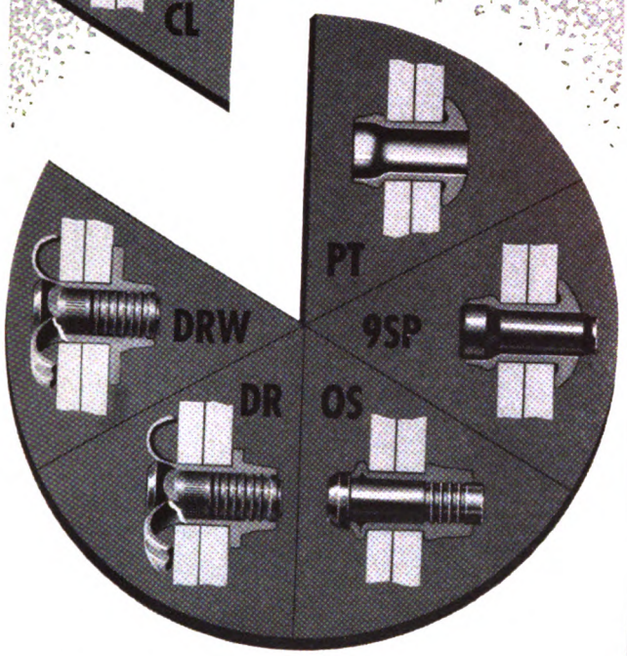
Stainless Plug Cocks

The galling of tank-car unloading connections is said to be eliminated using these key plugs made of V2B, a hardenable 18-8 stainless steel containing a small amount of beryllium. These cocks will handle acrylonitrile, butyraldehyde, ethylene glycol, glycerine, fatty acids, acetic acid, acetic anhydride, formaldehyde, toxaphene, phthalic anhydride, polyvinyl acetate, nitrogen fertilizer solution and nitric acid.

The alloy is soft enough to be machined in a quench-annealed condition. Heat treatment restores the gall-resistant characteristics. *Cooper Alloy Corp., Dept. RLC, Hillside, N. J.*

(Turn to page 92)

there's a HUCK FASTENER TO MEET YOUR REQUIREMENT



Hundreds of manufacturers here and abroad have found the answer to their toughest fastening problems in HUCK'S complete line of commercial, positive-locking rivets.

Huck fasteners are available in many sizes and shapes to meet the many specialized requirements of industry, from railroads to electronic fabrication. Their fast, simple application and positive locking features save production dollars, time and trouble for their many users—producing a better fastening job.

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U.S. Patent numbers 2531048, 2531049, 2754703, 2527307 and patents applied for.

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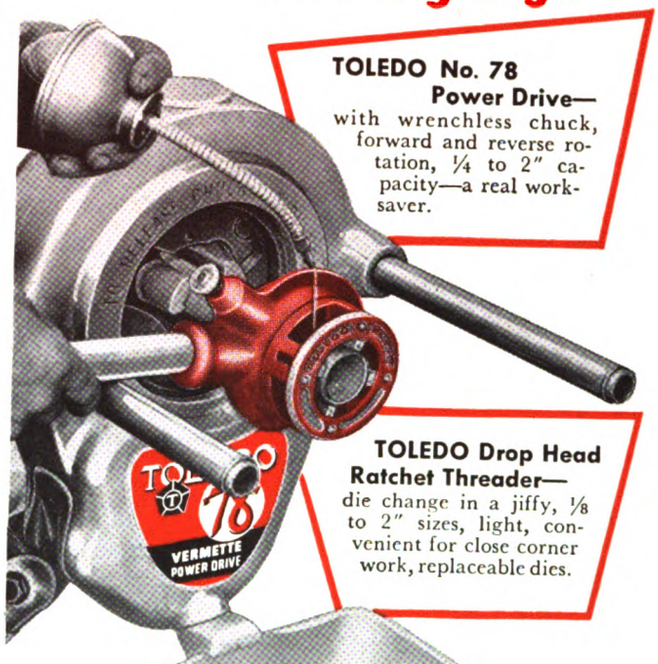

TOLEDO No. 78 Power Drive— with wrenchless chuck, forward and reverse rotation, ¼ to 2" capacity—a real work-saver.

TOLEDO Drop Head Ratchet Threader— die change in a jiffy, ⅛ to 2" sizes, light, convenient for close corner work, replaceable dies.

Take the toil out of threading . . . this chuck locks pipe or conduit in place—with one finger tightening. Just put the pipe in the wrenchless chuck, "finger" tighten, turn the switch and you're ready to go. Team the No. 78 with a TOLEDO Drop Head Threader and your threading jobs are turned out in seconds. See these TOLEDO-quality products at your supplier's today!

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First ASME Forum on Railroad Problems

A Railroad Division Technical Conference, intended to be the first of a series where advanced thinking on railroad problems can be considered, is to be held at the Sheraton Hotel, Chicago, April 25 and 26.

On Thursday morning, April 25, there will be a symposium on the use of economy type diesel fuels in locomotives. At the afternoon session the proper test techniques and equipment used in diesel engine and locomotive maintenance will be discussed.

Performance standards and recent developments in roller-bearing freight trucks, draft gears, and piggy-back equipment will be reviewed Friday morning, April 26. The afternoon session will be a symposium on corrosion prevention in freight cars, aluminum as a construction material will also be discussed.

A Railroad Division luncheon is planned for April 26, and a formal banquet and cocktail party for the evening of April 25. W. F. Ryan, president of the ASME, will speak at the banquet.

AAR Approves Cast-Steel Wheel

On March 1 the AAR approved as standard, the one-wear cast steel wheels for freight car service. The date marked the high point in several years' research, experimentation, and field testing by two of the large producers of cast wheels—the Griffin Wheel Company and the Southern Wheel Division of American Brake Shoe Company (now the Railroad Products Division).

In 1951 the AAR granted permission to Griffin and Southern for each to place 1,000 cast steel wheels in test service under interchange freight cars. Griffin's wheel, with a carbon content of 0.75, was designated the AARX-3 wheel, and the Southern wheel, with a carbon content of 1.50, was designated the AARX-2. Manufacturing techniques of the two companies were subsequently described in Railway Locomotives and Cars — Griffin in May 1953 and Southern in May 1955.

Reports on the performance of the test wheels were compiled regularly. To determine wearability, and accurate comparison with other wheels, each car used in the AAR tests was equipped with four cast steel wheels under one truck and four competitive wheels under the other. Griffin had 1,064 wheels applied under 219 cars under this arrangement, and Southern had 202 wheels under 49 cars.

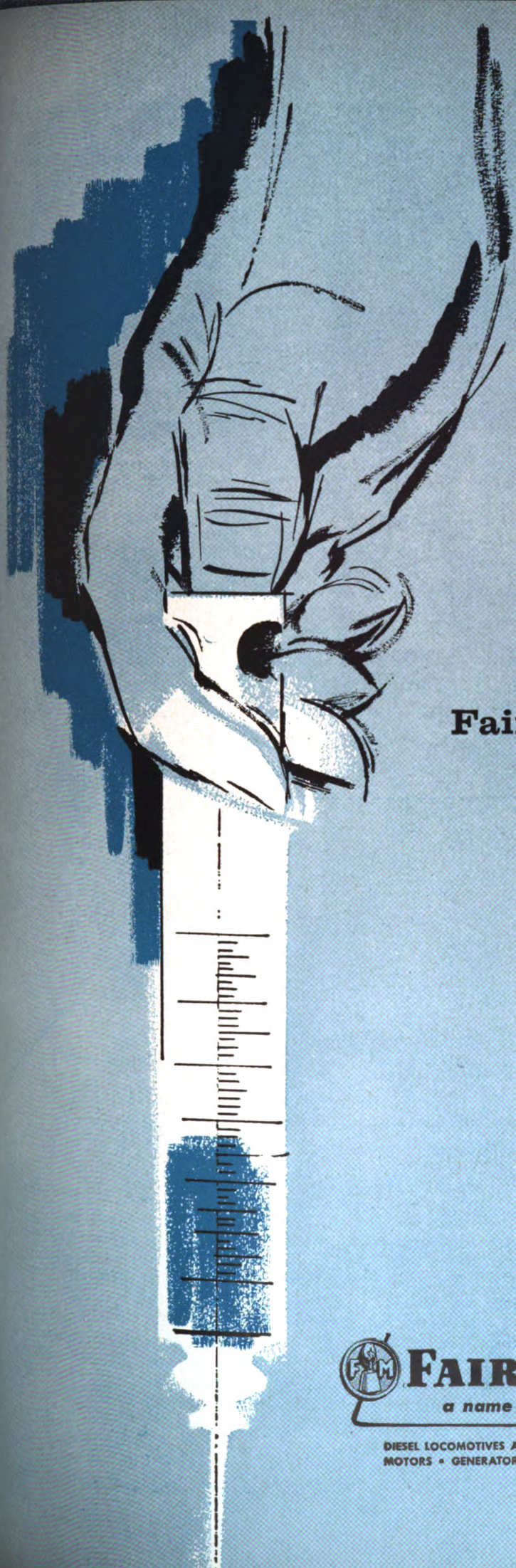
AAR quarterly reports indicate that Griffin wheels under the test cars averaged 88,700 miles, and Southern wheels averaged 141,400 miles.

When test wheels were inspected during this experimental period, wear

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

Item No.		Month of November		11 months ended with November	
	Freight Service (Data from I.C.C. M-211 and M-240)	1956	1955	1956	1955
3	Road locomotive miles (000) (M2-111):				
3—05	Total, steam	3,590	5,678	43,069	60,494
3—06	Total, Diesel-electric	37,144	36,714	409,422	390,395
3—07	Total, electric	696	752	7,996	8,226
3—04	Total, locomotive-miles	41,691	43,370	463,260	461,581
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1,664	1,697	18,604	18,436
4—06	Empty, total	972	963	10,356	10,082
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	9,210	12,796	107,275	139,565
6—02	Total in oil-burning steam locomotive trains	1,098	2,496	13,912	24,432
6—03	Total in Diesel-electric locomotive trains	107,692	103,250	1,182,791	1,107,103
6—04	Total in electric locomotive trains	2,157	2,196	24,891	25,061
6—06	Total in all trains	121,006	121,474	1,338,599	1,304,136
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.02	1.03	1.02
10—02	Loaded freight car-miles	42.8	42.0	43.1	42.9
10—03	Empty freight car-miles	25.0	23.8	24.0	23.4
10—04	Total freight car-miles (excluding caboose)	67.8	65.8	67.1	66.3
10—05	Gross ton-miles (excluding locomotive and tender)	3,110	3,006	3,101	3,034
10—06	Net ton-miles	1,421	1,365	1,422	1,378
12	Net ton-miles per loaded car-mile (M-211)	33.2	32.5	33.0	32.1
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	63.1	63.8	64.2	64.6
14	Averages per train hour (M-211):				
14—01	Train miles	18.7	18.5	18.6	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	57,411	55,119	56,899	55,917
14	Car-miles per freight car-day (M-240):				
14—01	Serviceable	47.5	48.1	46.9	46.9
14—02	All	45.8	46.1	45.1	44.5
15	Average net ton-miles per freight car-day (M-240)	960	957	956	924
17	Per cent of home cars of total freight cars on the line (M-240)	41.2	40.4	41.7	45.2
	Passenger Service (Data from I.C.C. M-213)				
3	Road motive-power miles (000):				
3—05	Steam	447	1,131	7,856	15,124
3—06	Diesel-electric	19,300	19,648	222,132	222,054
3—07	Electric	1,188	1,255	13,646	14,273
3—04	Total	20,935	22,033	243,636	251,458
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	213,632	226,201	2,519,217	2,573,284
4—09	Total in coal-burning steam locomotive trains	3,134	7,032	49,077	86,866
4—10	Total in oil-burning steam locomotive trains	407	2,759	14,760	44,580
4—11	Total in Diesel-electric locomotive trains	195,563	201,183	2,291,971	2,277,284
12	Total car-miles per train-miles	9.72	9.82	9.89	9.82
	Yard Service (Data from I.C.C. M-215)				
1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	220,558	313,679	2,547,845	3,177,163
1—02	Steam, oil-burning	20,962	48,143	330,972	536,892
1—03	Diesel-electric[1]	3,862,649	3,838,347	41,943,076	40,296,233
1—06	Total	4,108,083	4,204,771	44,862,031	44,078,950
2	Passenger yard switching hours				
2—01	Steam, coal-burning	4,900	7,731	62,136	91,640
2—02	Steam, oil-burning	2,386	5,441	35,204	58,222
2—03	Diesel-electric[1]	241,035	240,162	2,714,223	2,677,149
2—06	Total	273,140	279,217	3,083,340	3,110,980
3	Hours per yard locomotive-day:				
3—01	Steam	7.2	7.0	6.4	5.9
3—02	Diesel-electric	16.0	16.4	15.8	15.7
3—05	Serviceable	16.0	16.1	15.7	15.4
3—06	All locomotives (serviceable, unserviceable and stored)	14.9	14.7	14.4	13.8
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.71	1.72	1.67	1.66
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.79	.76	.75	.75

[1] Excludes B and trailing A units



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measurements and contour of the flange, tread and rim were taken for comparison with original measurements. Rims of the test wheels were prick-punched at four positions 90 deg apart; original and subsequent measurements were taken at identical locations. The difference showed the amount of wear, which was averaged for each wheel.

Since flange wear is considered a high factor in condemning wheels for freight service, additional measurements were taken of the tread and flange contour, using a planimeter to measure the area between the original tread contour and the contour at various check mileages. This comparison of contour gave the amount of metal worn off each wheel.

According to one manufacturer—although the service records are not yet complete—indications are that the cast-steel wheel is highly resistant to wear, shell out, thermal cracking and brake burn. It is reported that records to date show the wheels equal, and in many cases surpass, the service performance of other wheels in freight car service.

W. M. Keller Gets New Title

W. M. Keller has been appointed assitant vice-president, Operation and Maintenance Department, Association of American Railroads, with headquarters in Chicago. Mr. Keller continues also as executive vice-chairman and director of research, Mechanical Division.

AAR Vetoes Molygrease As Journal Box Lubricant

Grease containing molybdenum disulfide should not be used as an additive in journal boxes in place of car journal oil, the AAR committee on lubrication has ruled.

The committee reported that tests show molygrease clogs the fibers of lubricating pads, decreasing their efficiency. Other tests, it said, show a detrimental effect on the wicking qualities of journal box packing partially saturated with molygrease.

ICC Wants To Prescribe Brake Rule

The Interstate Commerce Commission has found itself without authority to prescribe rules for the installation, inspection and maintenance of power brakes on railroad equipment, but it has assured the Brotherhood of Locomotive Firemen & Enginemen and Brotherhood of Railroad Trainmen that it will continue to seek legislation giving it such authority.

That's how the commission has disposed of a petition whereby the brotherhoods sought to have brake rules prescribed. The petition was opposed by the Association of American Railroads, which contended that the commission lacked authority to grant the relief sought or even to conduct an investigation of the matter.

The commission heard oral argument limited to the question of its jurisdiction. While the brotherhoods contended that the commission had jurisdiction, their petition contained an alternative prayer that "all necessary steps" be taken promptly to secure the

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE FEBRUARY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and Builder	No. of units	Horsepower	Service	Other detail
BELT OF CHICAGO: Alco Products	1	900	Switching	Delivered in Feb.

FREIGHT-CAR ORDERS

Road and Builder	No. of cars	Type	Cap., tons	Details
BALTIMORE & OHIO: Pullman-Standard	200	Covered hopper	70	Approx. cost, $1,700,000. Delivery expected fourth quarter this year.
CHICAGO & EASTERN ILLINOIS: Bethlehem Steel	300	Hopper	70	Cost, $2,625,000. For June delivery.
CHICAGO, BURLINGTON & QUINCY: General American	75	Covered hopper	70	"Airslide" type. Estimated cost, $975,000. Delivery expected third quarter 1958.
COLORADO & WYOMING: Pullman-Standard	25	Gondola	70	Estimated cost, $220,000. Delivery expected late this year.
GENERAL AMERICAN TRANPORTATION CORP.	1,400	Airslide	—	For 1957-58 delivery.
JERSEY CENTRAL LINES: Bethlehem Steel	50	Gondola	70	Unit cost, $8,825. For delivery fourth quarter this year.
	50	Box	50	Unit cost, $7,900. For December delivery.
KANSAS CITY SOUTHERN: Bethlehem Steel	75	Gondola	70	Approx. cost per unit, $8,900. For fourth quarter delivery.
MACON, DUBLIN & SAVANNAH: ACF Industries	50	Covered hopper	70	Estimated cost, $440,000. Delivery expected third quarter 1957.
MAINE CENTRAL: ACF Industries	200	Box	50	Estimated cost, $1,600,000. Delivery to begin late summer.
MINNEAPOLIS, ST. PAUL & SAULT STE MARIE: Company shops	25	Box	50	Insulated. The 225 cars to be delivered in 1958.
	200	Flat	—	
	200	Gondola	—	
NORFOLK SOUTHERN: Bethlehem Steel	50	Hopper	50	Cost, $345,000. For April delivery.
NORTHERN PACIFIC: General American	25	Covered hopper	70	"Airslide" type. Estimated unit cost, $13,010. Delivery expected third quarter 1958.
PHILADELPHIA, BETHLEHEM & NEW ENGLAND: Bethlehem Steel	30	Gondola	70	Estimated cost, $275,000. Delivery expected late this year or early in 1958.
SEABOARD AIR LINE: Greenville Steel Car	12	Flat	50	With special bulkheads. Approx. cost $125,000. July delivery.
UNION TANK CAR CO.: Company shops	32	Tank	—	Cap., 10,600 gal. For delivery this year.

INQUIRIES and NOTES

LOCOMOTIVES:
Denver & Rio Grande Western—Allocated $2,548,130 for purchase of 10 SD-9 1,750-hp diesel-electric road-switching units for delivery June or July.

ELECTRICAL DIVISION

LIGHTING DIVISION

THE HOWE SCALE COMPANY

SAFETY RAILWAY SERVICE CORPORATION

Constantly aware of the effort of railroad management to provide the best in modern service with the lowest possible operating cost . . . these divisions of SAFETY INDUSTRIES, INC. . . .

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- Lighting Division
- The Howe Scale Company
- Safety Railway Service Corporation

pledge their research and manufacturing facilities . . . to a continuing program of product development and to the production of quality equipment, competitively priced . . . to meet the exacting requirements of the railroad industry and the long range objectives of railroad management.

ELECTRICAL DIVISION . . . manufacturers of all types of electrical equipment including air conditioning systems, for railroad rolling stock.

LIGHTING DIVISION . . . designers and manufacturers of lighting fixtures and luggage racks for railroad passenger cars and Infra-Red Ovens for repair shops.

THE HOWE SCALE COMPANY . . . producers of railway track scales . . . a complete line of both conventional and automatic industrial weighing and batching equipment . . . and the most modern hand, baggage and dragline trucks.

SAFETY RAILWAY SERVICE CORPORATION . . . provides preventive maintenance on railroad passenger cars and also a repair service for "Safety" equipment.

SAFETY INDUSTRIES, INC.

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necessary authority if that contention were rejected.

The commission promise to do the latter was the result of its conclusion that there is a "definite need" for brake rules. It recalled that it supported a so-called "brake-inspection" bill introduced in a previous Congress. "We will," the report added, "continue to take appropriate action to secure the desired authority."

Fuel Association Changes Name

As the result of a letter ballot of its membership, the name of the Railway Fuel and Traveling Engineers' Association has been changed to the *Railway Fuel and Operating Officers Association*. The next annual meeting of the Association will be held at the Hotel Sherman in Chicago, September 16, 17 and 18.

Wheel Association Changes Name

Members of the Association of Manufacturers of Chilled Car Wheels at their recent annual meeting voted to change the name of the organization to the *Railway Wheel Association*. "This change was made so as to avoid the indication that the product represented was confined only to chilled cast-iron wheels," an association spokesman said. "Actually it will include the newly developed cast-steel wheels recently adopted by the Association of American Railroads as an approved standard for freight-car service."

Membership of the Railway Wheel Association is made up of all but one of the commercial manufacturers of cast-iron wheels in the United States and Canada. In addition, two of these members are also producers of the new cast-steel wheel in the United States.

The activities of the association will not be changed. The staff will continue to handle plant inspection and other technical matters relating to cast-iron wheels. They will also represent the manufacturers of both cast-iron and cast-steel wheels where the product in general is involved. This latter function would apply particularly to items on wheels being considered by various AAR committees.

Officers of the newly named association are Clifford M. Stoner, president and Raymond Wellington, secretary.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
November, 1952	2,984,102	2,198	4,501	6,699	445,455
November, 1953	2,788,773	1,987	3,404	5,391	517,301
November, 1954	2,717,219	2,515	3,467	5,982	454,232
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759

Committee To Study Repair Charges and Billing Procedures

The AAR has formed a special working committee to further the studies of simplified procedures to reduce cost of billing for car repairs. The committee, consisting of three representatives with mechanical background and one with accounting, is made up of the following members: E. W. Gebhardt, district supervisor car maintenance, Chicago & Northwestern; J. P. Svetlecic, car foreman, Missouri Pacific; I. H. Mattern, foreman, car inspectors, Reading; J. B. Matt, special traveling auditor, Southern.

Considerable research will be involved and much of this in the field so as to have a sound basis for proposed charges as developed for consideration by the Arbitration committee for incorporation in the Interchange Rules. Field studies will be made on railroads in various geographical locations, to obtain representative conditions throughout the country.

Since this work will be carried on under the supervision of the Arbitration Committee, Interchange Rule No. 124 already provides a basis for the kind of survey which will be made.

The AAR expects these studies will be made at facilities such as repair tracks, train yards and billing office. It emphasizes that these studies will be made without interference with the working forces of the railroad and with minimum assistance from supervision. Practices followed by the various railroads will not be questioned and the AAR prefers the working forces carry on their work in the regular manner in the event it becomes necessary to make checks covering some of the operations which are listed in the so-called price rules of the Interchange code.

The committee will make its first visit to a railroad in the near future, and the AAR urges the fullest cooperation with the group in order to obtain the greatest benefits for the railroad industry.

1956 Equipment Orders and Deliveries

Class I railroads put 1,453 new locomotive units in service last year, compared with 1,182 units in 1955, the AAR reports. Installations in 1956 included 1,445 diesel-electrics and eight electrics, while 1955 installations included 1,172 diesel-electrics and 10 electrics. Locomotive units on order January 1 for Class I railroads aggregated 814 (780 diesel-electrics, 30 gas-turbine-electrics, four electrics), compared with 854 units (827 diesel-electrics, 15 gas-turbine electrics, 12 electrics) on order January 1, 1956.

The backlog of freight cars on order and undelivered on January 1 totaled 117,257 as compared with 147,320 on January 1, 1956, according to ARCI and AAR reports. Cars ordered last year aggregated 41,223, compared with 169,872 in 1955 and 23,324 in 1954. Cars delivered in 1956 totaled 67,080, compared with 36,896 in 1955 and 35,558 in 1954.

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Patented Outlets for Covered Hopper Cars

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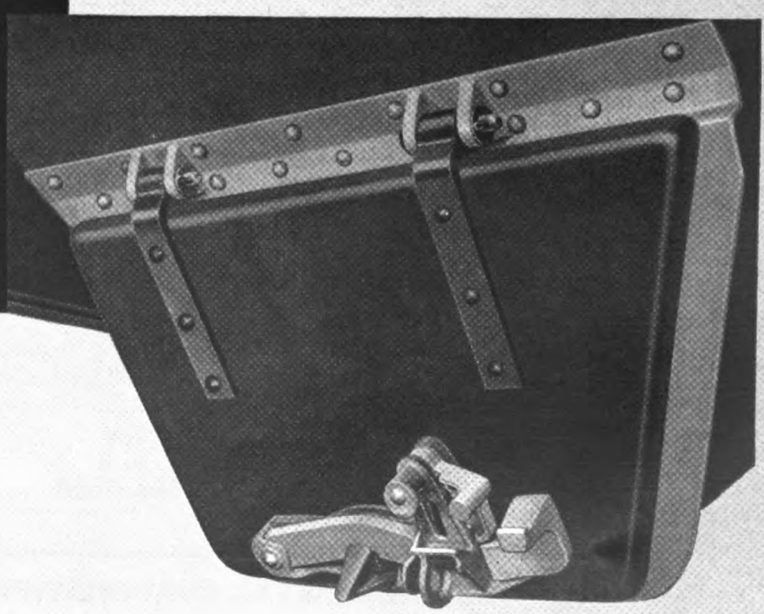
Patented Unit Latch Device for Hopper Cars



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1905 - 1955

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ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.

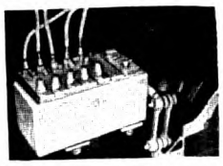
FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

MAGNUS High Mileage

TRACTION MOTOR SUPPORT BEARINGS

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange Lubricators

Safety Valves

Fuel Tank Sight Gages

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Step in the right direction

...safety devices

secured with *Elastic Stop*® nuts

Today, major Diesel builders are using Elastic Stop nuts for a variety of critical applications.* No other fastener provides so much positive protection against the pounding vibration that is a part of modern high speed freight and passenger operation.

Elastic Stop nuts offer production and maintenance advantages, too. The same elastic collar that damps out vibration makes the nuts self-locking—a one-piece assembly—and reusable many times.

Many roads are replacing double nuts or castellated nuts with Elastic Stop nuts wherever safety of personnel and maintenance costs are factors. ESNA can serve you better on these and all other critical applications.

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coupler carriers
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ROLLPIN TRADEMARK

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SURER, SAFER, SIMPLER CONTROL

NEW! REDIPAK® Twin Lubricating Pads

WITH BUILT-IN UNIVERSAL RETAINERS

give

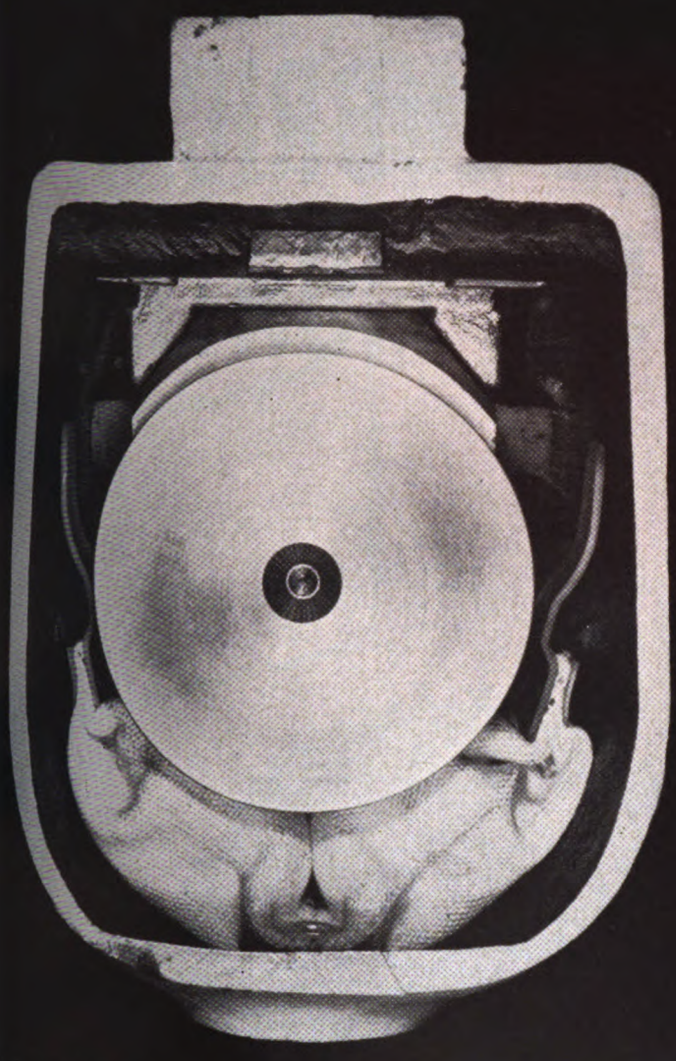
Positive Shift Prevention! Built-in fiber retainers prevent both endwise shift and shift from journal rotation. Pad resilience holds retainers against side of box, away from journal. One universal style for use in boxes with or without retaining ribs.

Far Better Wicking Action! New heavier cotton weave provides superior wicking action. Cover is woven as a single tube, eliminating all possible seams from the wicking path. The twin design also provides for equalization of the oil level in the journal box through a channel at the center.

Improved Resilience! Twin inserts are made of specially molded foam neoprene, compounded to our specifications. This provides excellent set resistance and oil absorption properties, and is designed for improved resilience.

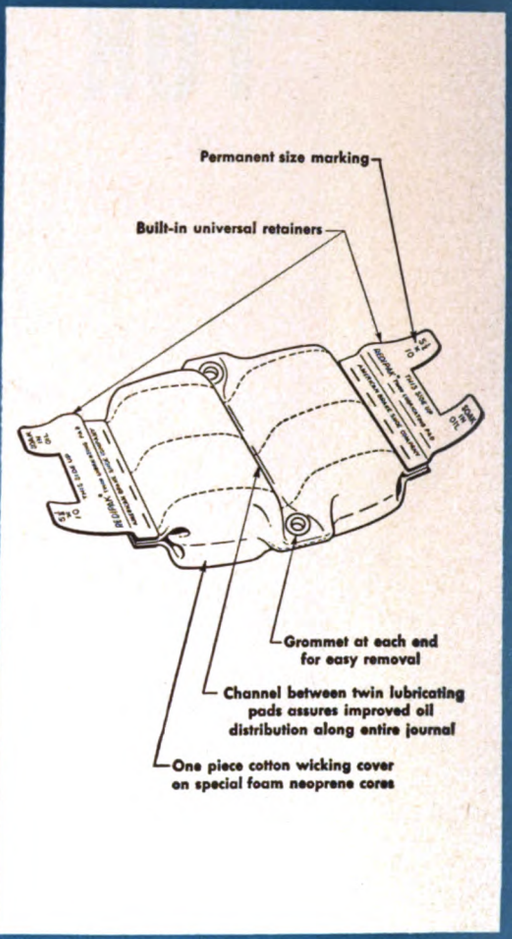
Superior Oil Distribution! New twin design assures improved oil distribution along the entire length of the journal.

L OF THE HOT BOX PROBLEM!



For boxes with or without retaining ribs, fiber plates integral with the new Redipak twin pads engage the stop columns, preventing both endwise and rotational shifting.

COMPARE THESE FEATURES OF REDIPAK TWIN PADS



Here it is . . . the new, improved Redipak twin lubricating pad! This latest triumph of American Brake Shoe's bearing research retains the simplicity, economy, and durability of the original model—yet achieves new standards of dependable, all-year-round lubrication!

This new Redipak twin lubricating pad is even easier to install, too. Sturdy fiber retainers keep it securely in position . . . whether or not the box is equipped with retaining ribs.

Try out this new Redipak twin lubricating pad and see for yourself how it improves lubrication!

AMERICAN Brake Shoe COMPANY

RAILROAD PRODUCTS DIVISION

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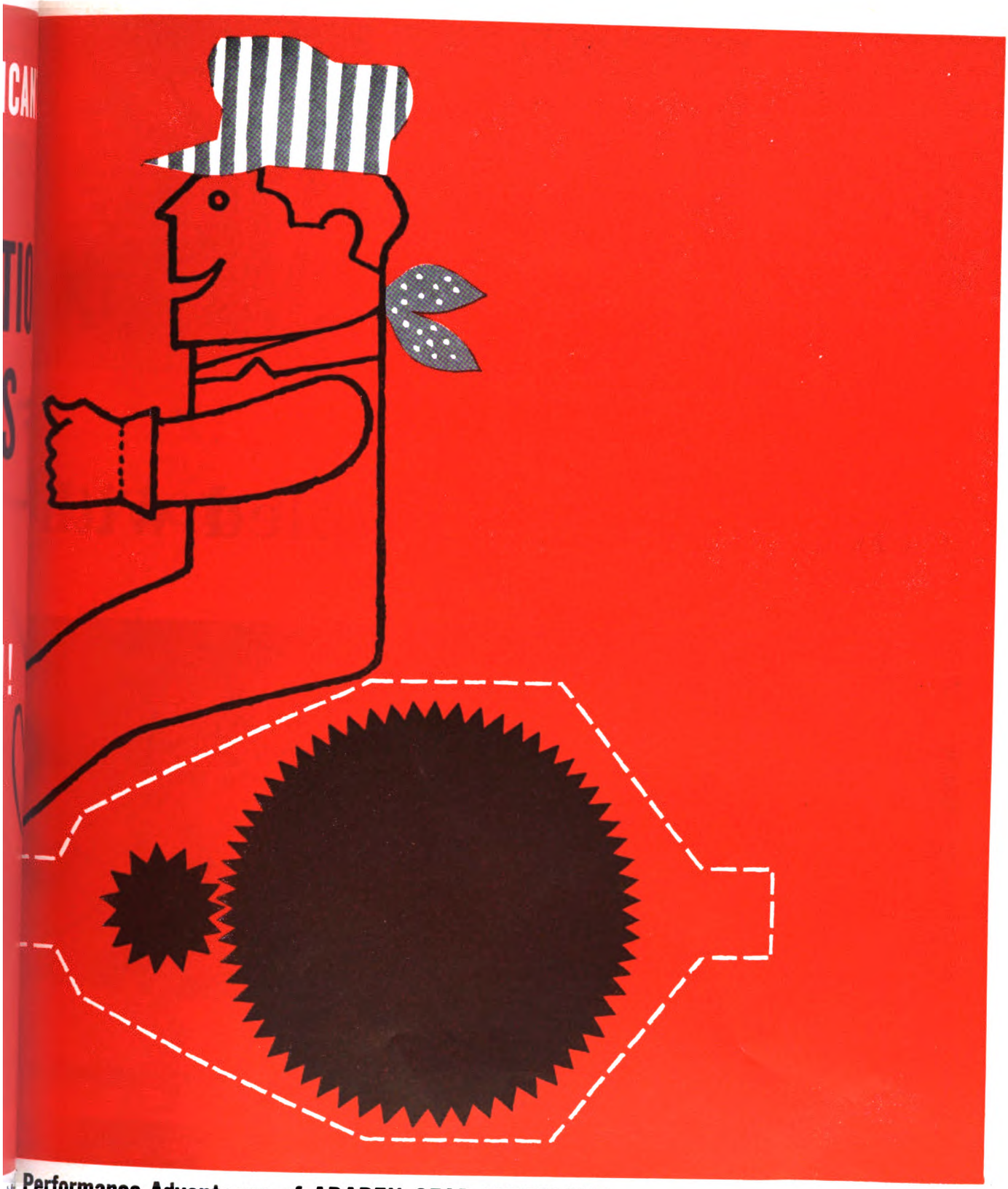
A-4542

NEW ESSO ARAPEN GEAR LUBRICANT GIVES TRACTION MOTOR GEARS DEPENDABLE LUBRICATION FOR OVER SIX MONTHS ...WITHOUT GREASE ADDITION!

ARAPEN GEAR LUBRICANT—an important new traction motor gear lubricant developed by Esso Research – is now available to *you*. But before going on the market, this remarkable new product was thoroughly tested in the lab and *on the road*.

On the New York Central... Arapen Gear Lubricant was tested for 18 months in regular diesel freight service. The test proved the feasibility of six months' operation without additional lubrication.

NEW YORK CENTRAL SYSTEM



Performance Advantages of ARAPEN GEAR LUBRICANT:

Anti-Leakage Characteristics: maintains consistency through full range of operating temperatures, resulting in a minimum of drippage on ties, pits and station platforms.

Excellent Oxidation Stability: permits extended operation without hardening.

Excellent Structure Stability: minimizes failures due to dry gears because of excessive gear case leakage.

Excellent Wear Characteristics: provides proper lubrication throughout life of gears.

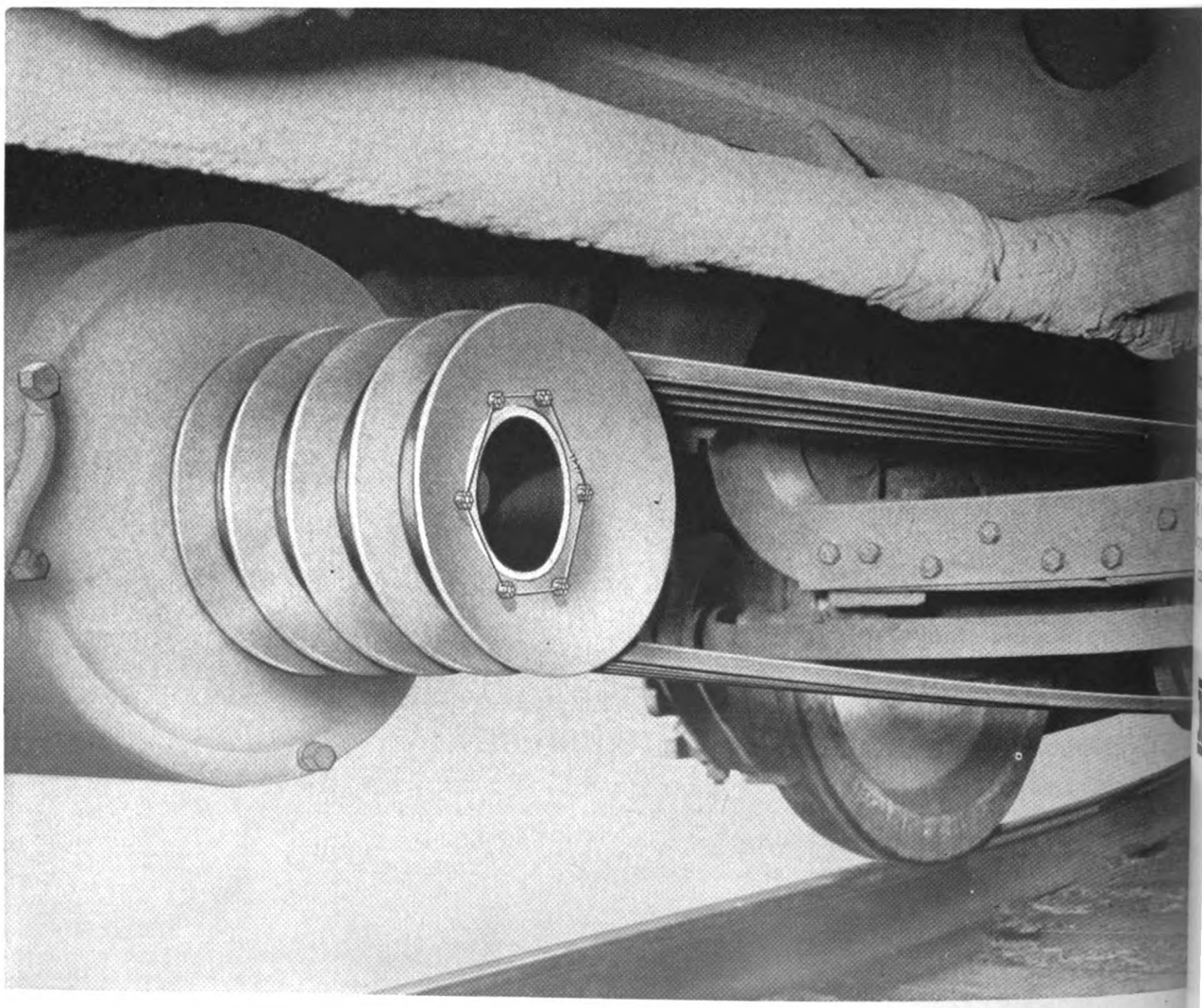
For complete information and technical assistance in the use of new Esso Arapen Gear Lubricant, call your local Esso office or write: Esso Standard Oil Co., Railroad Sales Div., 15 W. 51st St., N.Y. 19, N.Y.

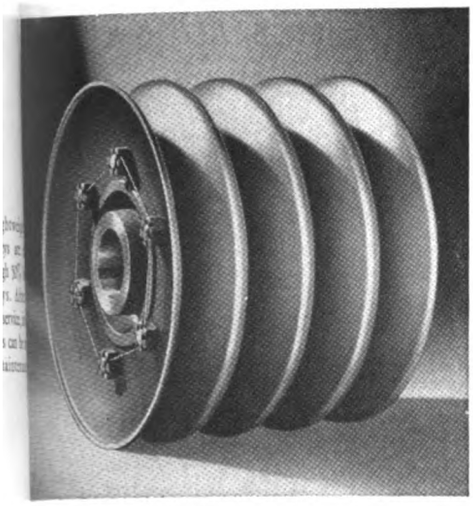
Esso

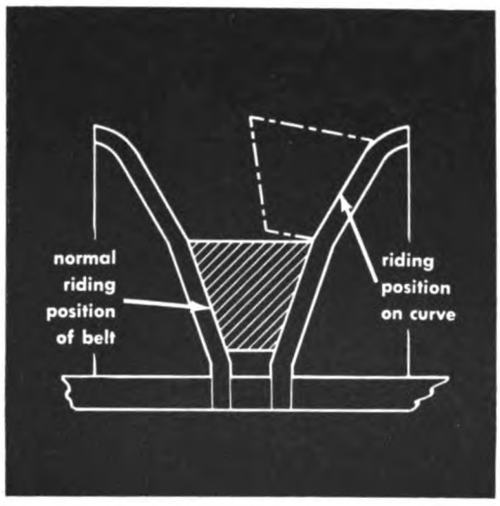
RAILROAD PRODUCTS

Dayton Lightweight Generator Pulleys are easy to handle, weigh 50% less than cast pulleys. After long, trouble-free service, individual worn flanges can be replaced, keeping maintenance low.

Bearing life Tripled with







Double angle groove design of Dayton Pulleys keeps belts from "turning over" in the groove when the truck goes around a curve. Instead, belt slides up pulley side to second angle, providing full, positive power at all times.

Dayton Lightweight Pulleys

50% Less Weight . . . Precision Balancing of Every Pulley . . . Cuts Vibration and Saves Armature Bearings.

Armature bearings lasted 3 and even 4 times longer in tests by major railroads, when generators were equipped with Dayton Lightweight Pulleys.

Made of highest quality pressed steel, these pulleys weigh approximately 50% less than heavy, hard-to-handle cast pulleys. Dayton's exclusive design and perfect balance virtually eliminate vibration. With weight cut in half and vibration minimized, wear on armature bearings is tremendously reduced.

When flanges finally do become worn after thousands of miles of service, Dayton Lightweight Pulleys further reduce costs and make replacement easier, faster. Flanges can be replaced individually instead of replacing the entire pulley, saving time and money.

Dayton Lightweight Pulleys in two, three and four groove sizes are available in both standard and offset models for all popular generator applications.

Best of all, these lightweight pulleys cost no more than outmoded, cumbersome, cast pulleys.

A Dayton Railway V-Belt Drive Engineer is ready to help you with a test installation of Dayton Lightweight Generator Pulleys or any other railway V-Belt Drive problem. Write The Dayton Rubber Company, Railway Division, Dayton 1, Ohio.

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, New York, San Francisco and St. Louis

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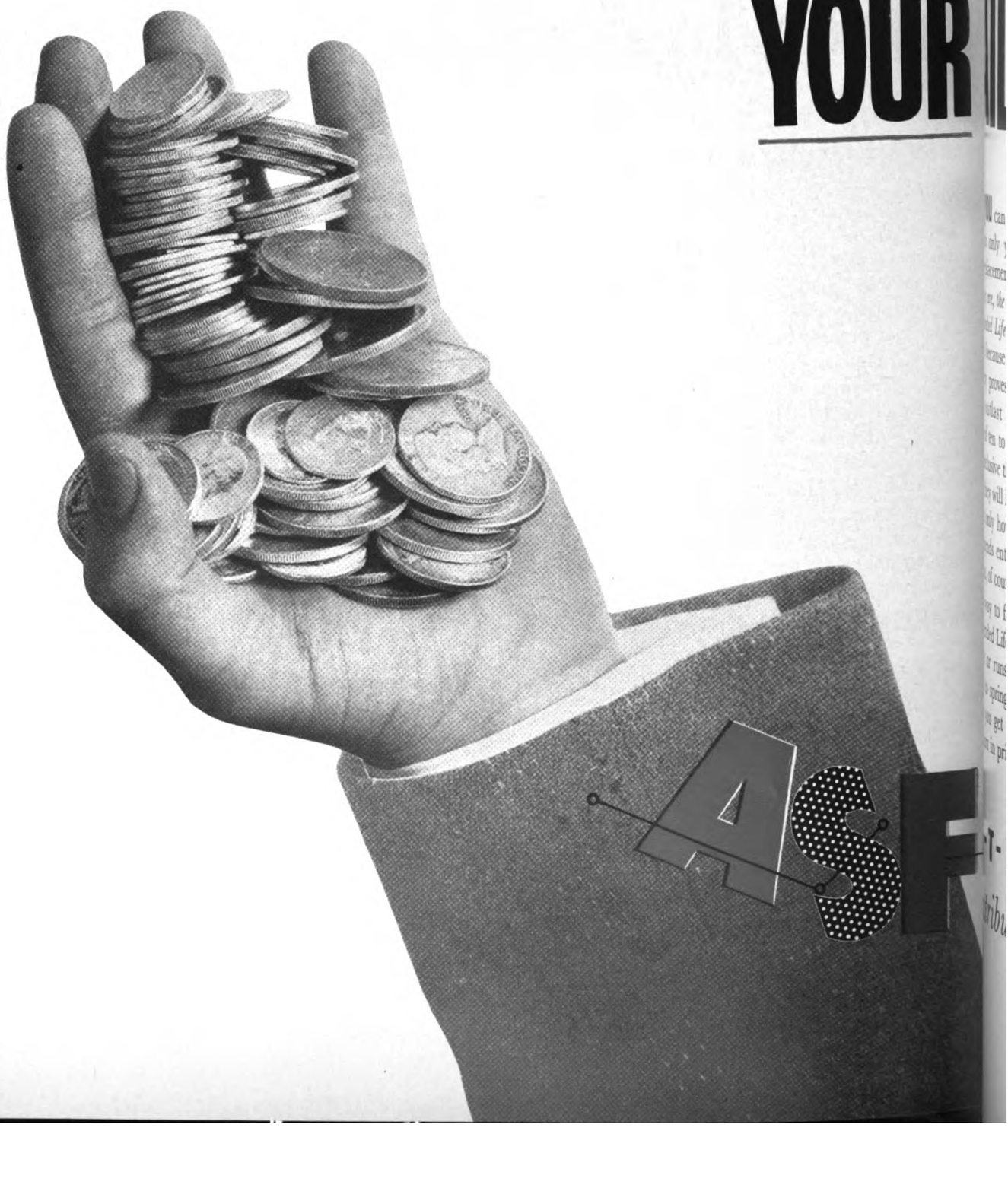
HOW MUCH MONEY THIS SPRING SAVE YOUR



no extra cost . . .

CAN ON RAILROAD?

Only you can answer that question—because only you know what your spring-replacement costs are. But, *the higher they are, the more you will save with ASF Extended Life brand springs.*

That's because test after test in the laboratory proves that Extended Life Springs outlast ordinary springs an average of ten to one. The test results are so conclusive that it is not a question whether they will last longer under your cars, but only how many *times* longer. That depends entirely on your service conditions, of course.

Here's a way to find out: Specify new ASF Extended Life Springs where types of service or runs result in bad-order cars due to spring failure. You'll soon find that you get premium service—at no premium in price!

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A contribution to railroad progress...through research by

AMERICAN STEEL FOUNDRIES

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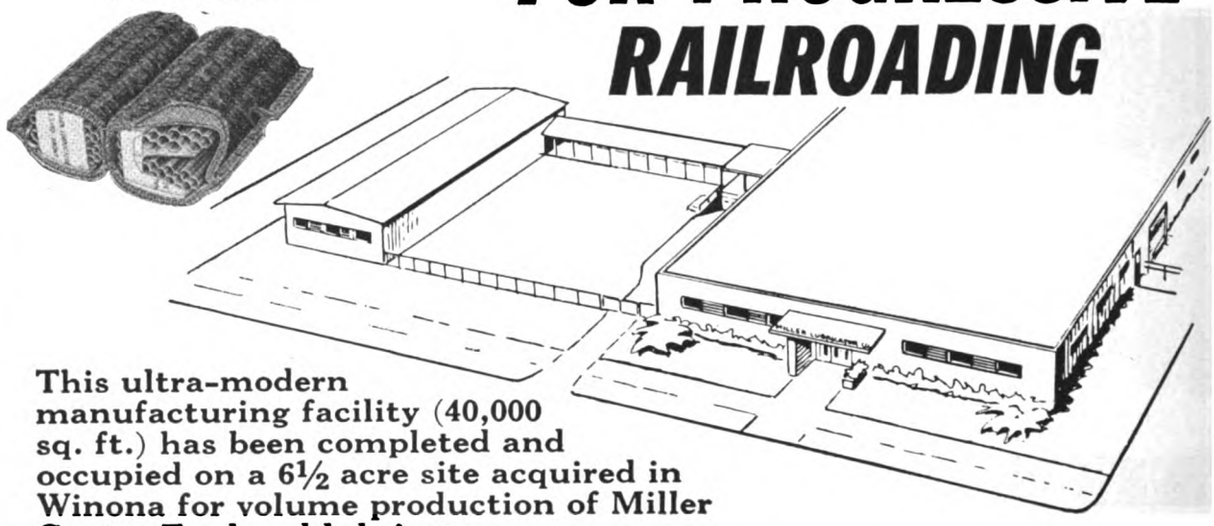
66,000 CARSETS TO DATE

FOR PROGRESSIVE RAILROADING



This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller Center Feed pad lubricators.
Additional capacity, regardless of amount, to meet every Railroad requirement will be installed promptly when needed. 30,000 sq. ft. will be added early 1957.

- *Volume quantities—immediate delivery*
- *Cost—$40 per carset (for all sizes)*
- *Life expectancy—6 years*

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To Low Cost Wheel Maintenance

FCC Flange Cutters
ABRASIVE BRAKE SHOES

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Chapter Two of this practical how-to-do-it series will appear in the April issue of Railway Locomotives & Cars.

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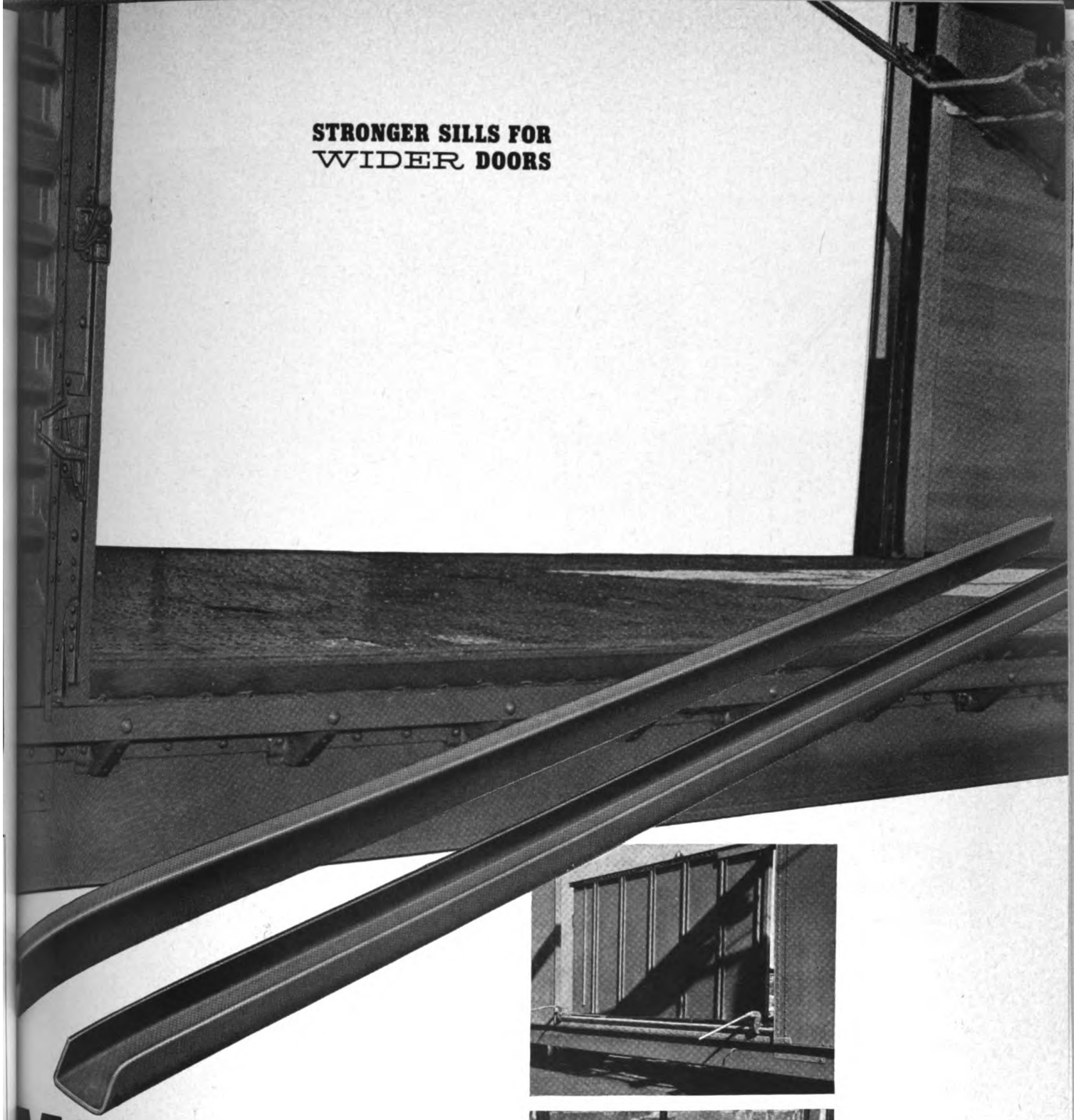

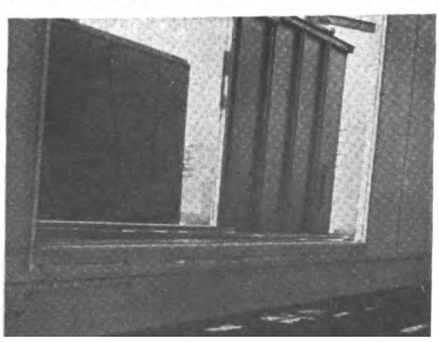

AND with the 'M-F' Threshold Plate uniform length floor boards may be used throughout the car.

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Threshold Plates

are permanently welded structural members of the car . . . they provide more rigid openings — *more necessary than ever with wider doors!*

Floor boards don't pass under the 'M-F' Threshold Plate — worn or broken floor boards are more easily and more quickly replaced. . . . . .

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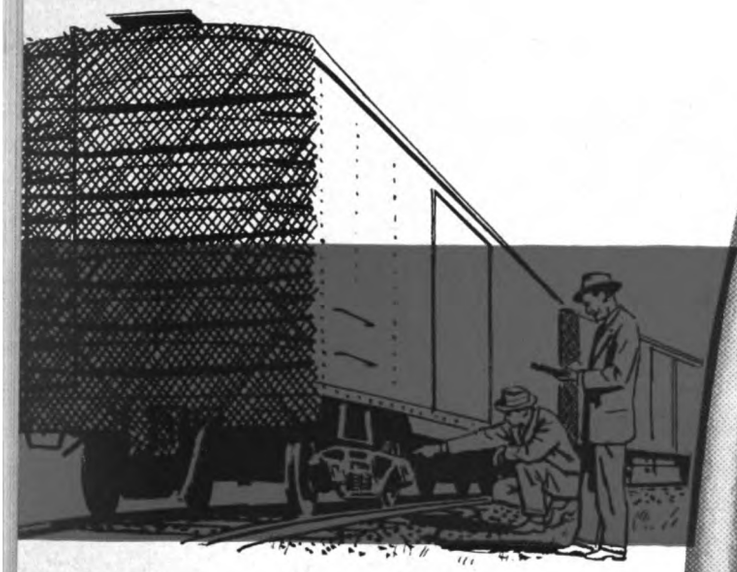

1953 to 1956

Griffin EQS is placed in service under all types of cars and performance is so outstanding that the railroads move to adopt it as standard.

GRIFFIN EQS

ELECTRIC QUALITY STEEL

Griffin Wheel Company

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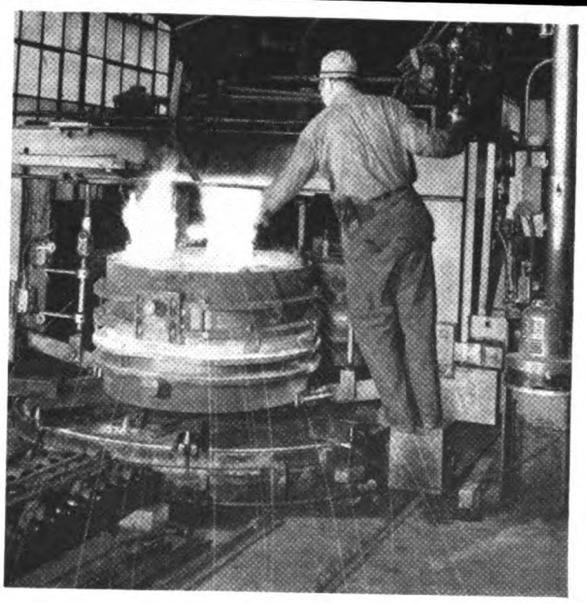
In Canada: GRIFFIN STEEL FOUNDRIES, LTD., St. Hyacinthe, Quebec

Plants strategically located to serve all railroads



1952

Griffin announces an entirely new concept of producing freight car wheels . . . a steel wheel, pressure-poured in precision graphite molds to fine tolerances.

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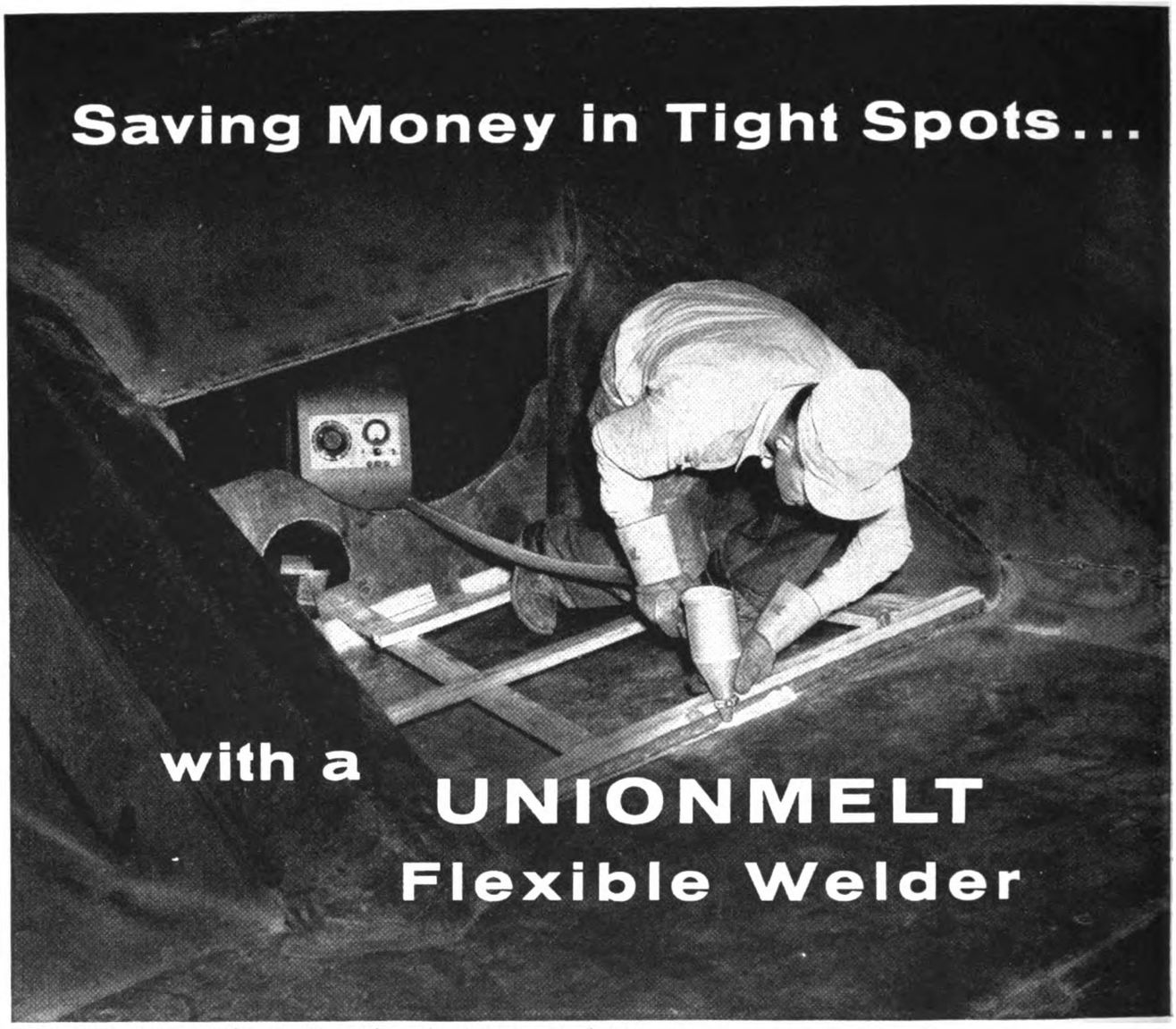
Griffin EQS...now approved as

AAR STANDARD

Effective March 1, 1957

Give the "green" to ***GRIFFIN*** *and watch your costs go down!*



A UNIONMELT flexible welder simplifies and speeds fabrication of a hopper car.

Wherever flexibility and maneuverability are required in welding, the UNIONMELT flexible welder far outperforms rigid, mechanical installations . . . Welding in corners and in tight spots is no problem with this sturdy portable unit, and top quality welds are produced at speeds up to 40 inches per minute in many operations. The combination hopper and welding head is lightweight, and requires no special skill to operate.

Combines Advantages

This UNIONMELT flexible welder combines the speed of mechanized installations with the operational freedom of manual welding. Wire feed unit and controls are mounted on a mobile carriage which can be moved quickly from one job to another, or from point to point on the same job. Initial investment for flexible welding equipment is considerably less than for stationary automatic welding installations—operations are economical, and maintenance costs are low.

For more information on this and other modern methods for car fabrication, call your local LINDE representative, or write today for free illustrated literature.

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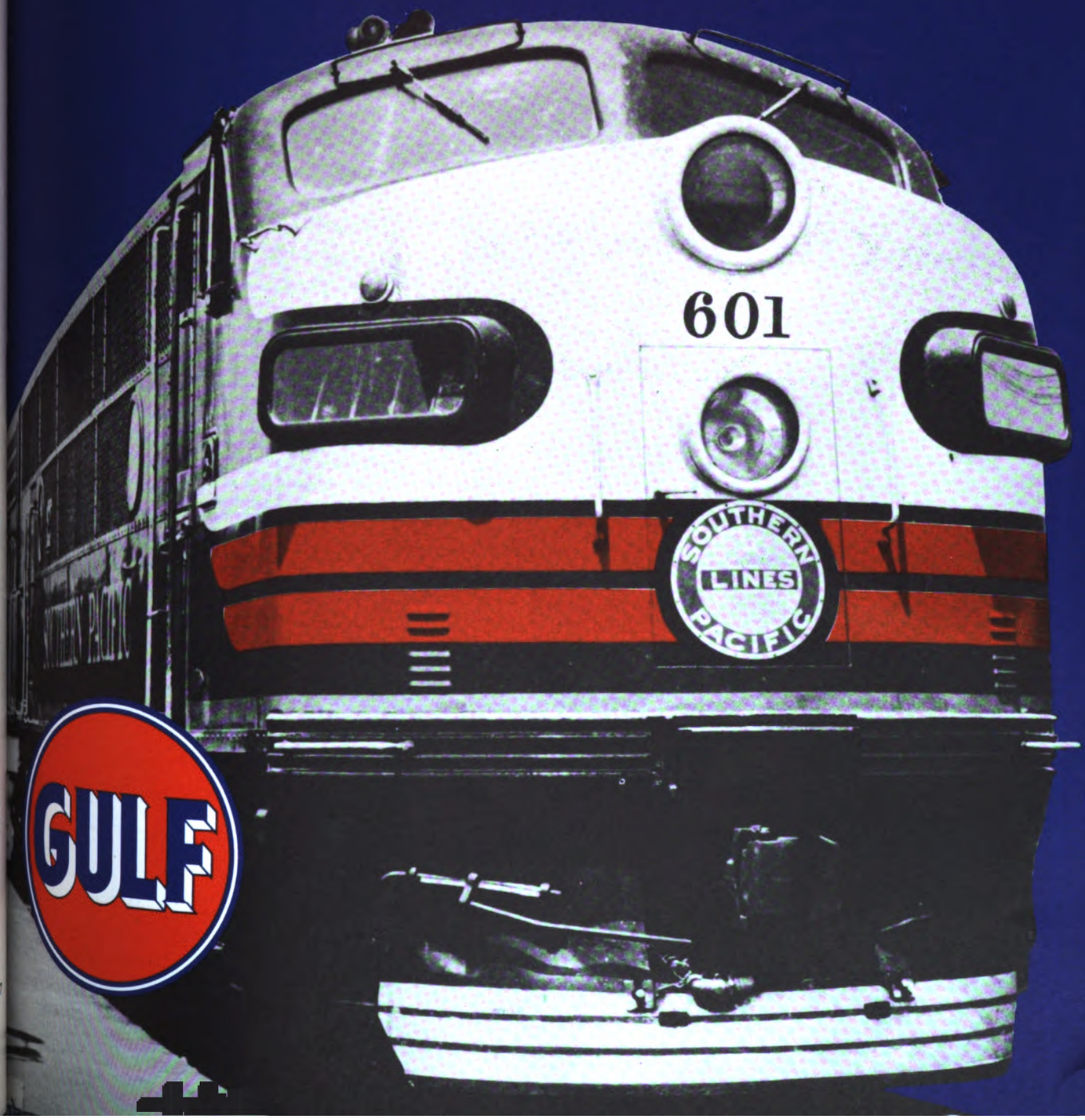
The terms "Linde", "Oxweld", and "Unionmelt" are registered trade-marks of Union Carbide.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol . . .

new

GULF DIESELMOTIVE 78

—the oil that helps engines maintain full-rated power!



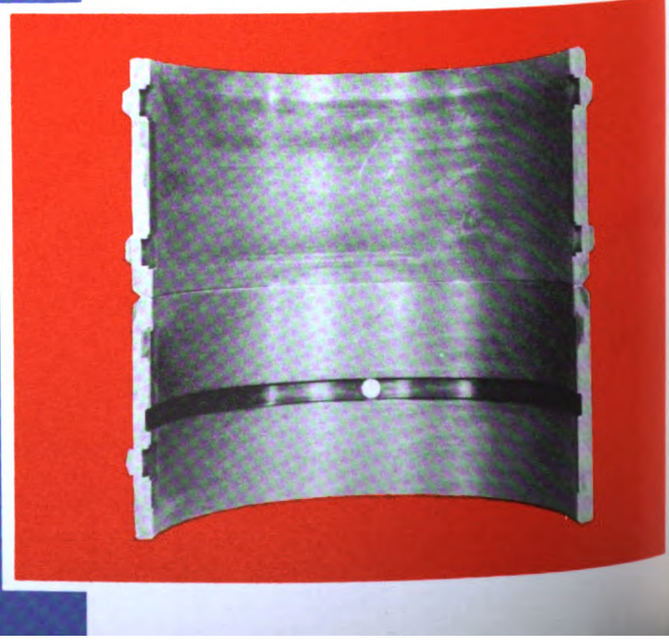
new
GULF DIESELMOTIVE 78

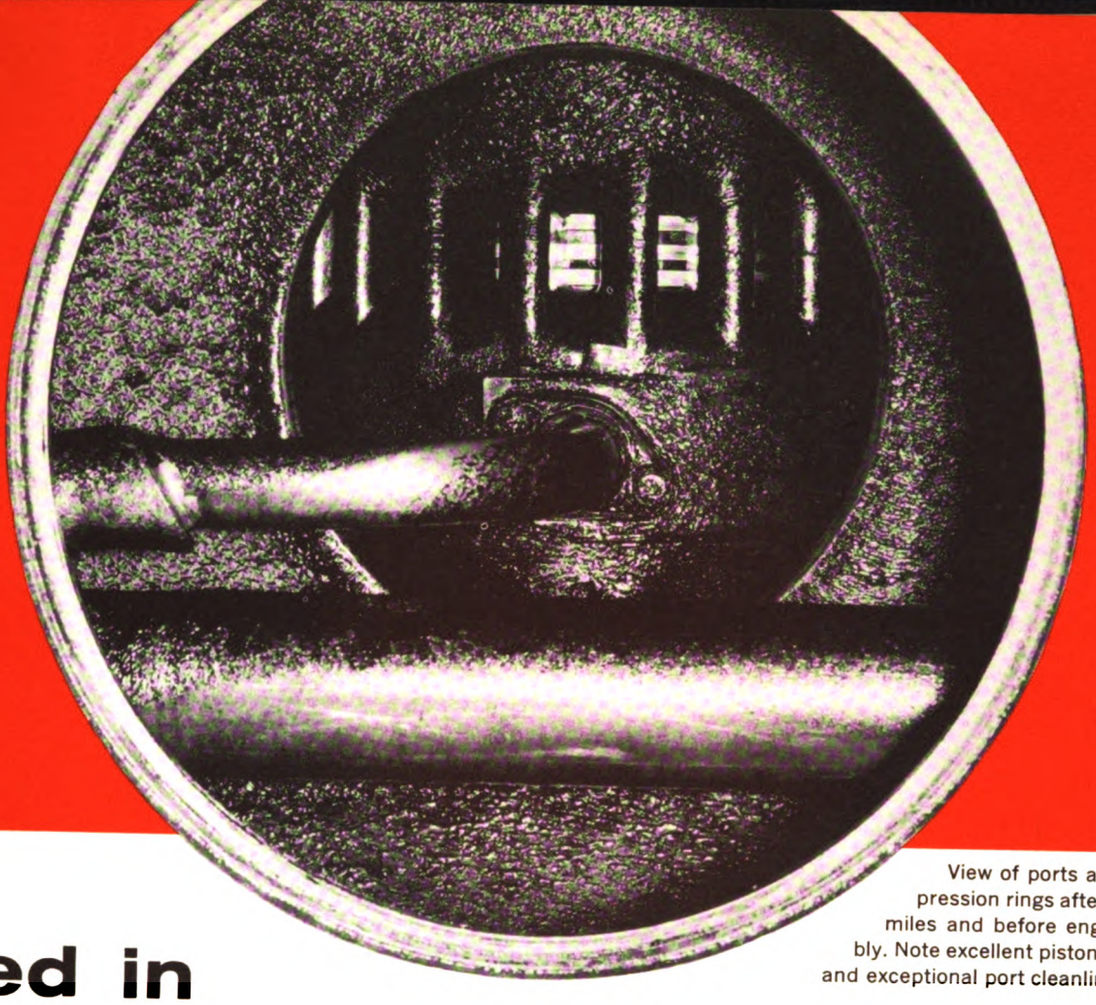
keeps engines operating at top capacity

Your engines will stay cleaner longer with new Gulf Dieselmotive 78. This new oil is formulated with base stocks that have inherent film strength, lubricity and excellent oxidation characteristics . . . providing a built-in safety factor. In addition, new Gulf Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils! This additive reserve insures cleaner engines, less wear on rings, pistons and liners than ever before!

After 165,825 test miles on Gulf Dieselmotive 78, the pistons looked like this upon removal from an engine. All the rings are free and ring wear is at a minimum. Undercrown deposits are negligible. Note freedom from any substantial lacquer deposits on piston skirt.

Main bearings are free of lacquer and ready for further service, after their long trial period of 165,825 miles of operation.



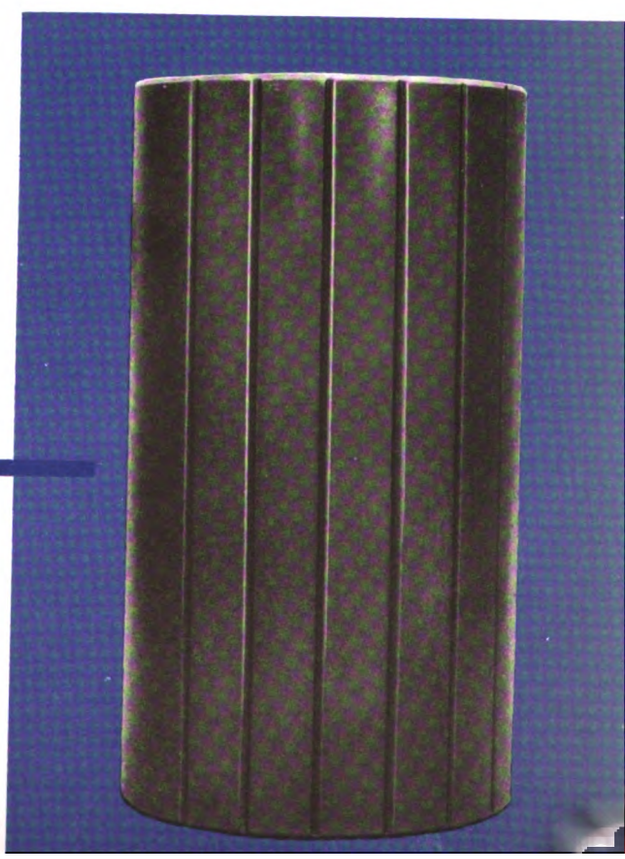


View of ports and top 3 compression rings after 165,825 test miles and before engine disassembly. Note excellent piston ring condition and exceptional port cleanliness.

proved in Southern Pacific Railroad tests over 330,000 miles of toughest freight hauls!

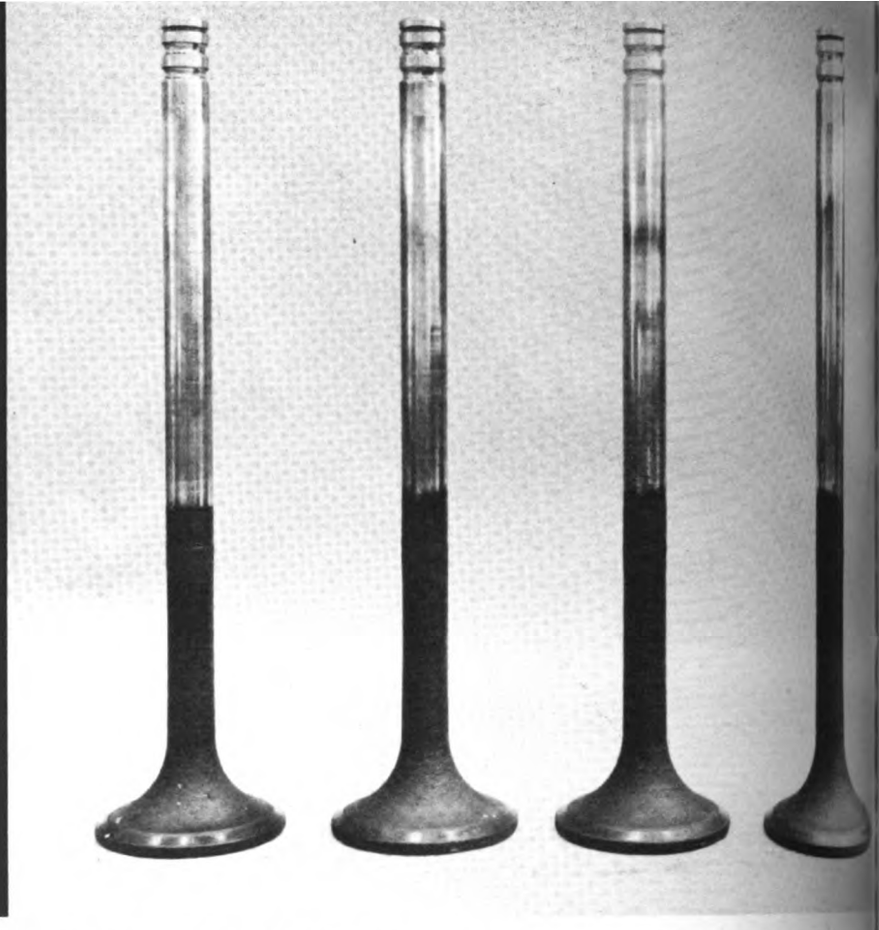
In a grueling 330,000 mile test, Gulf Dieselmotive 78 was used in EMD 567-C units on Southern Pacific Lines in Texas and Louisiana. On this tough run, ambient temperatures range from 0 to 110°.

After 165,825 miles, a detailed inspection was made of the engines. Rings and ring grooves were extremely clean, as were all intake ports. Deposits under the piston crown were negligible. There were no heavy deposits or varnish anywhere in the engine. And main bearing shells were in such excellent condition that they were put back in the engine for further service!



Wrist pin bushing shows no corrosive etching at edge of silver plating adjacent to grooves. There is no evidence of scuffing on the silver plating, even after long periods of high output service. This bushing was reinstalled for further service.

Note excellent condition of thrust washer. Wear was well below condemnation limits.



Note excellent condition of exhaust valves and absence of any hard carbon deposits. Valve stems show no significant lacquer or carbon deposits at point of valve guide travel limit.

New Gulf Dieselmotive 78 retains its stability even when subjected to high temperatures for extended periods. This oil enables high output engines to deliver their full rated horsepower. Under certain conditions, railroads can even increase the tonnage rating of their locomotives!

Find out now what new Gulf Dieselmotive 78 can do for *you*. Contact your nearest Gulf office, or use the coupon below for further information.

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

☐ Send more information on Gulf Dieselmotive 78.
☐ Have a Gulf Sales Engineer call.

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____

GULF

GULF OIL CORPORATION
1822 Gulf Building
Pittsburgh, Pa.

Now Perishables Travel in Style

Mechanical reefers are big news today—and *good* news to shippers of fresh and frozen foods. These de luxe refrigerator cars carry all types of perishables—quickly, cheaply, and above all safely—to markets all over the country.

Fruit Growers Express and its associates, Western Fruit Express and Burlington Refrigerator Express, now point proudly to more than 1000 of these supercars in service. And others are on the way. In the very near future, nearly 1300 will be available to the nation's shippers.

Refrigeration is completely automatic; thermostatic controls make possible any temperature between zero and 70 deg F. Thus, whether a cargo requires subfreezing cold or moderate warmth, the proper "weather" can be maintained throughout an entire journey.

Needless to mention, these fine new cars are equipped for fast travel and heavy loads. They skim over the rails on husky, durable wrought-steel wheels and forged-steel axles, many of which are of Bethlehem manufacture. Since Bethlehem wheels and axles are completely at home in high-speed, heavy-duty service, the choice was of course appropriate from every standpoint.

BETHLEHEM STEEL

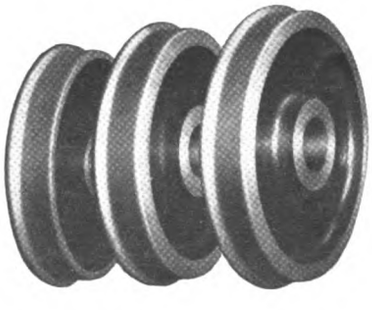
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

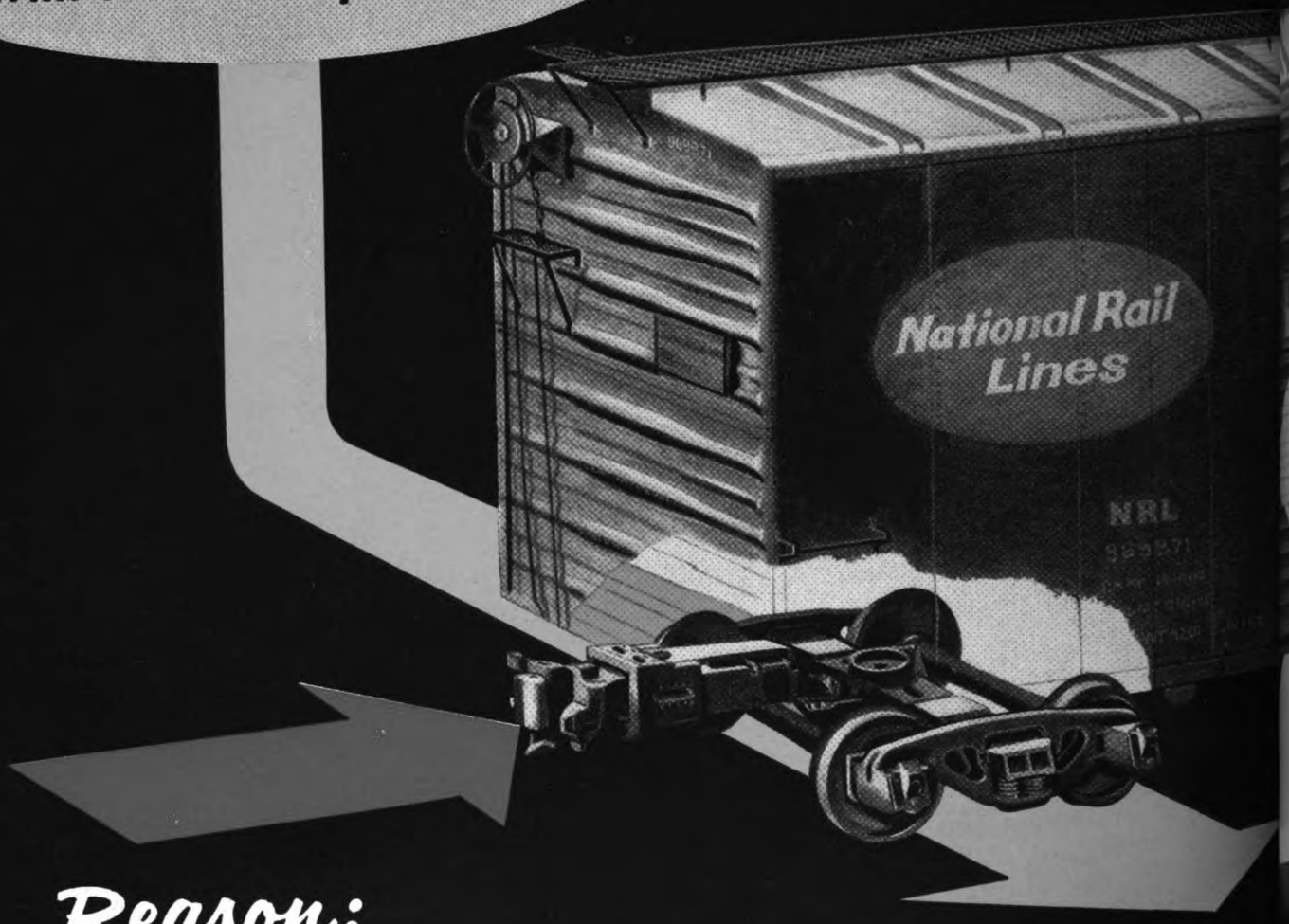
BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

FREIGHT • PASSENGER • DIESEL

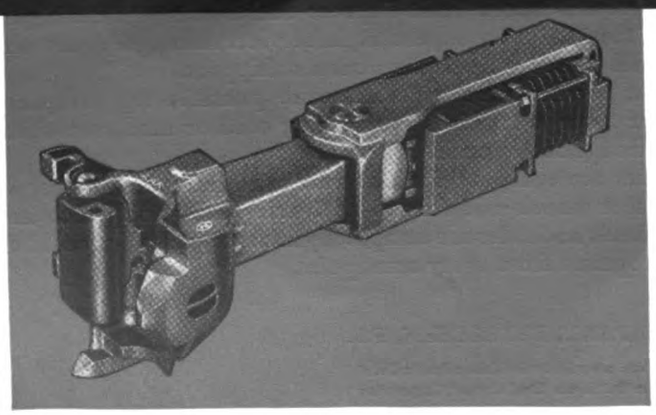


There's Improved Railroading with National Specialties



Reason:

NATIONAL PROTECTION



Draw Gear Assembly

Reduce costly maintenance of cars by using National MF-400-1 Rubber-Cushioned Draft Gears, with National Type F Interlocking Couplers and National Y-45 Yokes. This combination makes a perfect shock control team to effectively cushion end-to-end impacts.

GEARED TO PROGRESS
P R I
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NATIONAL MALLEABLE and STEEL

Railway Division Headquarters
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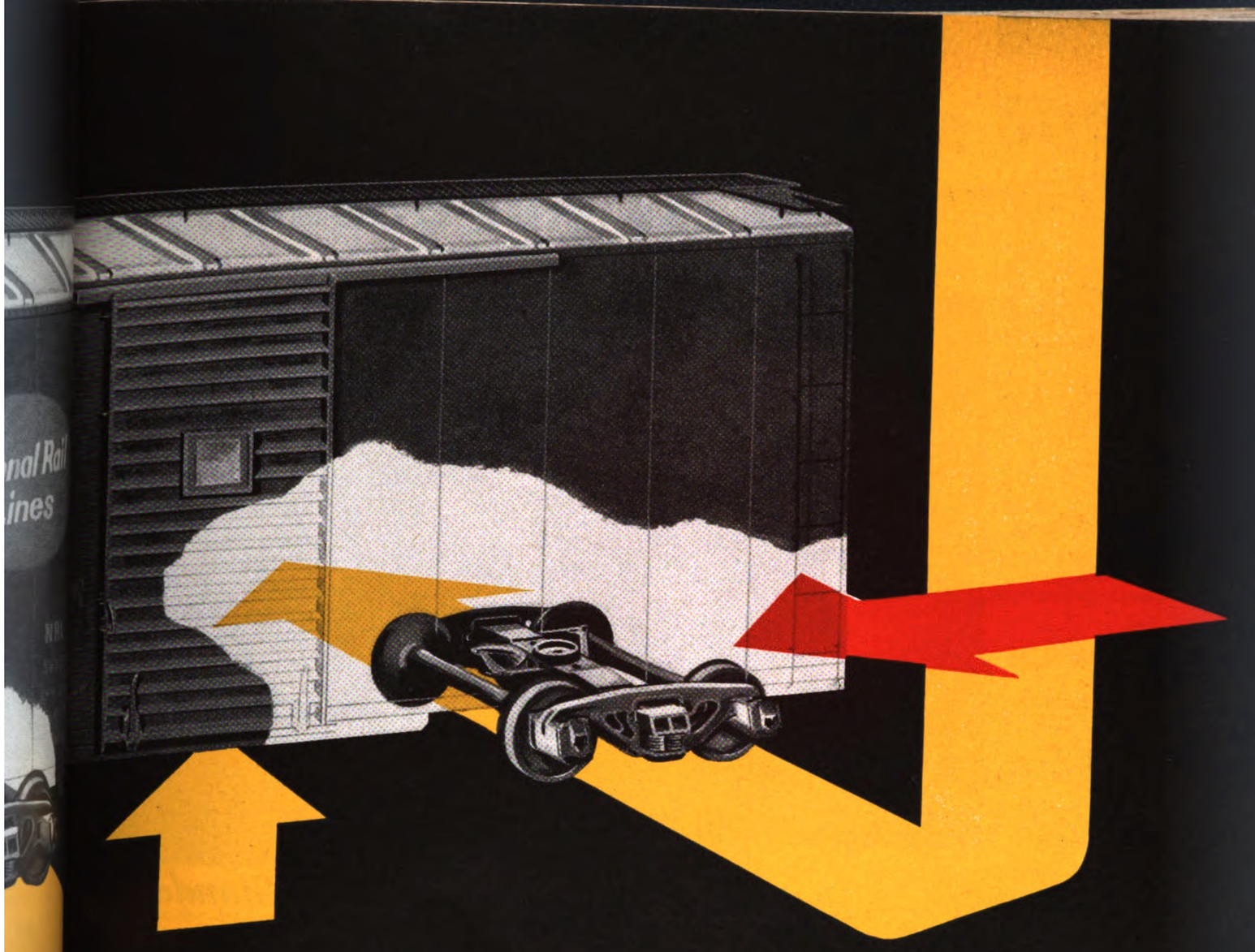
COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS
SNUBBER PACKAGES • JOURNAL BOXES

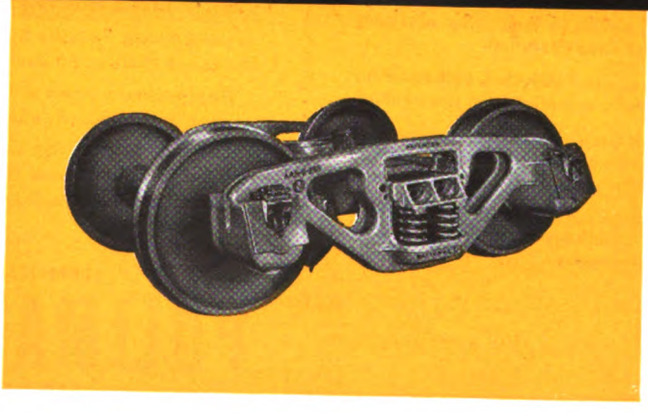


FROM EVERY DIRECTION *reduces maintenance*

National C-1 Truck

With built-in friction control devices, C-1 trucks provide positive *lateral* control and protection against *vertical* shocks for a smoother ride that reduces damage to rolling stock, lading and roadbed.

AA-4488



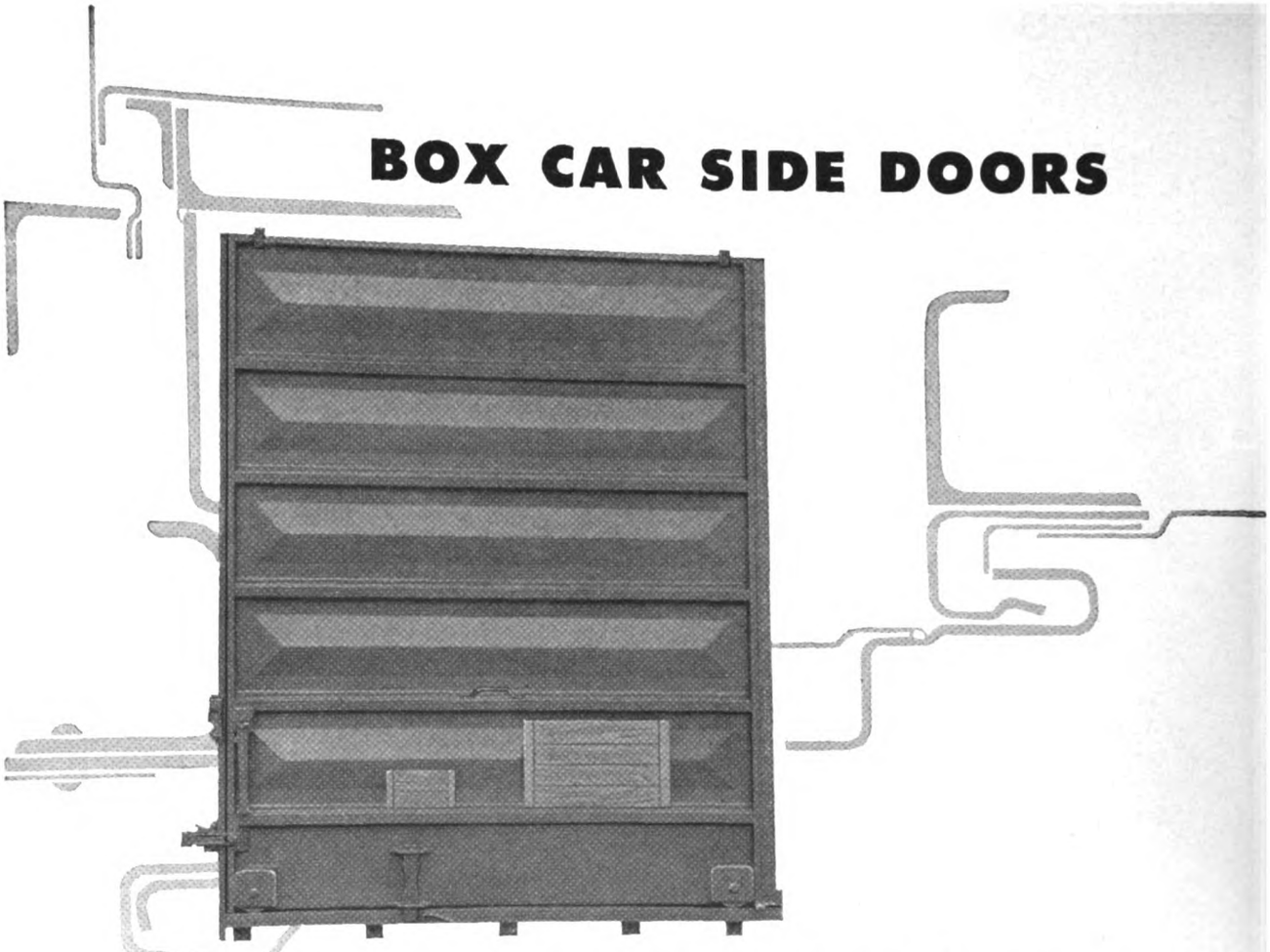
CASTINGS COMPANY

International Division Headquarters
Cleveland 6, Ohio

Canadian Subsidiary • National Malleable & Steel Castings Company of Canada, Ltd. • Toronto 1, Ontario

Established in 1868

BOX CAR SIDE DOORS



designed and built by Pullman-Standard

- **Design: by the world's largest car-builder . . . with fifteen years' experience in door manufacturing.**
- **Size: 9′ 11″ or specified height. 6′-7′-8′-9′ or specified width.**
- **Complete with fixtures and sub-parts, all to P-S design.**
- **Panels of .10-inch corrosion-resistant copper bearing steel. Lock, starter and bumper of cast steel. All parts weldable.**
- **Extra-heavy (5/32-inch) bottom member.**
- **5″ rollers in door roller assembly insure easy operation.**
- **Precision fabricated, embossed for strength, assembled by arc-welding.**
- **All around sealing arrangement excludes dirt and weather, safeguards lading.**
- **Self-protecting design and fabrication excellence mean long life, easy maintenance.**

Pullman-Standard has designed, built and laboratory and service tested a new box car side door, with integral fixtures, to fill the needs and specifications of the railroad industry. Offering maximum lading protection from dirt and weather, this new door is sealed all around by specially designed interlocking contours. The unit rolls smoothly and easily on large 5-inch diameter rollers with hardened roller bearings. The safety latch and door lock work as a unit. And the safety latch automatically locks the door in either the open or closed position after one car impact. The entire door and fixture unit is made for lasting service, durability and rugged strength.

After extensive field research to determine railroad and shipper requirements, prototypes of this door were designed, built and put into continuous laboratory and in-service tests more than three years ago. Every possible test was applied time and time again. The P-S Door withstood every abuse. Example: over 75,000 severe individual roller and bearing impacts were test-applied to prove the door roller assembly.

Confirming "on the job" acceptance of this new unit by America's railroads are the more than 2500 car sets now in service or on order by 12 major users.

Replacement parts will be kept on hand by Pullman-Standard, and railroad orders will be filled immediately from inventory.

For full information on the new P-S Box Car Side Door, and how it can be applied to PS-1 Box Cars now on order, write for literature or contact the nearest Pullman-Standard sales office.

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

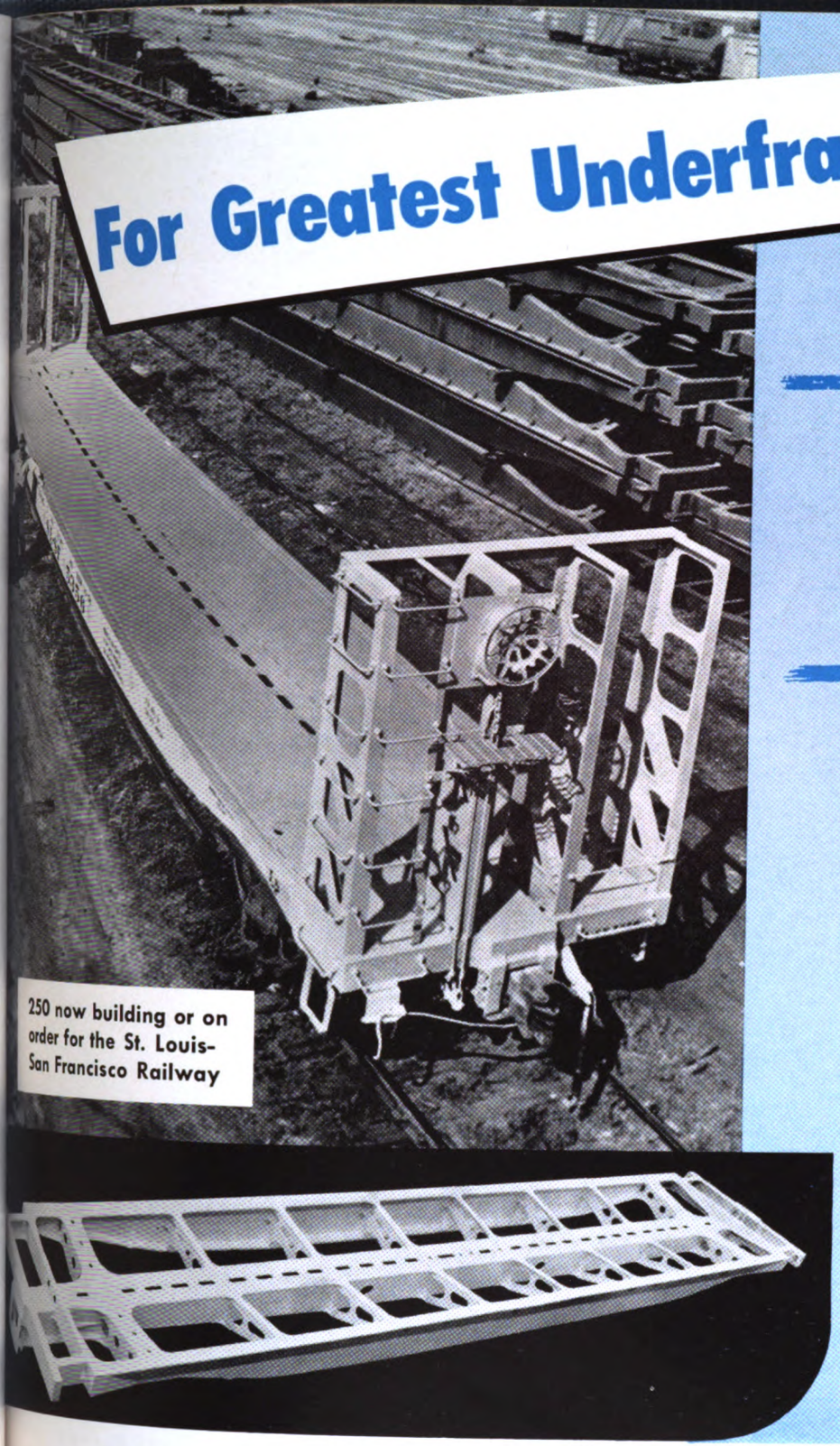
CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

For Greatest Underframe Strength



250 now building or on order for the St. Louis-San Francisco Railway

Maximum Capacity

Maximum Revenue

New FRISCO

70-Ton Pulpwood Cars Have Commonwealth One-piece Underframes and Interlocking Upright Bulkheads

Again Frisco specifies Commonwealth Underframes for greater payload . . . more round trips per month . . . lowest upkeep costs and maximum revenue. The larger capacity of these well designed 70-ton cars—approximately 30 cords—is made possible by the greater strength at less weight of Commonwealth one-piece cast steel Underframes and interlocking bulkheads.

What's more, corrosion is no problem, and these cars provide longer life, continuous availability with Underframes that are *maintenance-free*. If you aren't realizing the profitable investment Commonwealth Underframes offer, it will pay to investigate now.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. • EDDYSTONE, PA. • AVONMORE, PA.

GEARED TO PROGRESS P R I MEMBER

Being interviewed is W. W. Smith, Divisional Manager, Product Engineering. Grids in back are of Exide's exclusive Silvium. Those in front are ordinary alloys.

"All of these alloys had the same acid test"

At the Exide Laboratories—**Reporter:** Was it a typical charge-discharge test normally used to test battery components?

Smith: Right. And the two positive plate grids with no visible signs of corrosion are Exide's patented Silvium alloy.

Reporter: How about the others—what alloys are they?

Smith: They're standard alloys used in other well-known makes of batteries. But they don't have Silvium's corrosion-resisting ingredients.

Reporter: Where is Silvium used?

Smith: In the positive plates of all Exide-Ironclad and many other Exide Batteries.

Reporter: How does it affect battery performance?

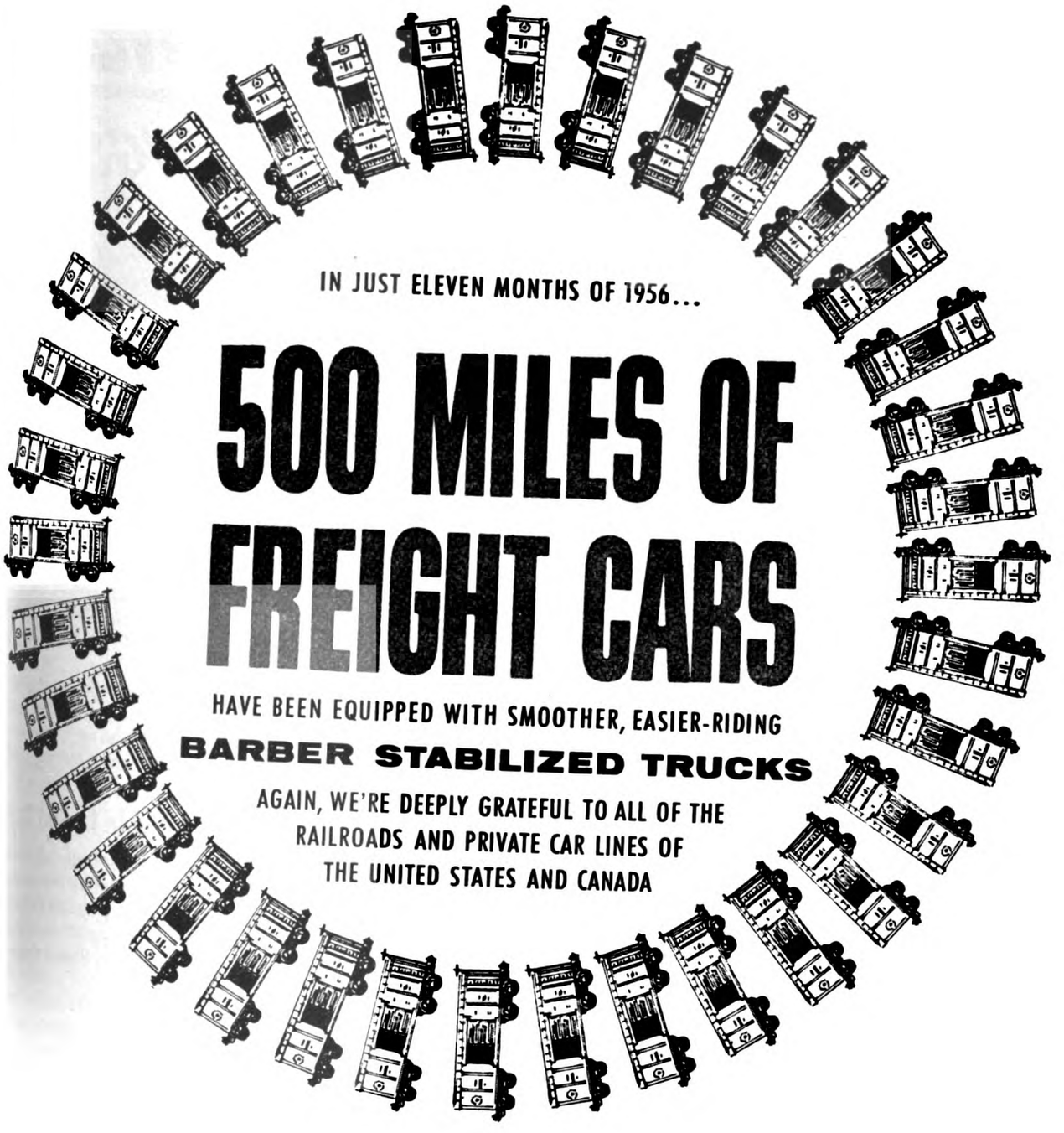
Smith: Every test we've made proves it stretches battery life because the grid resists corrosion—sometimes up to 100% longer.

Reporter: Obviously this is an important feature of the Exide-Ironclad.

Smith: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®



IN JUST ELEVEN MONTHS OF 1956...

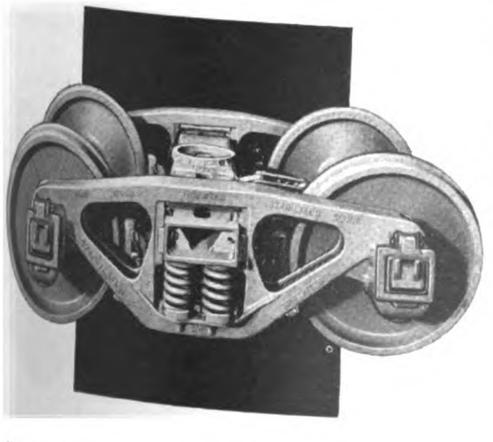
500 MILES OF FREIGHT CARS

HAVE BEEN EQUIPPED WITH SMOOTHER, EASIER-RIDING

BARBER STABILIZED TRUCKS

AGAIN, WE'RE DEEPLY GRATEFUL TO ALL OF THE RAILROADS AND PRIVATE CAR LINES OF THE UNITED STATES AND CANADA

They cost so little . . . give so much protection . . .



BARBER

STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

Here's why FREIGHT CARS NEED SOLID JOURNAL BEARINGS

It's not just a question of low initial cost: you also choose solid-type bearings because they offer the utmost in load capacity, protection for lading, ease and simplicity of maintenance and many other advantages. They all add up to a BIGGER NET RETURN per car dollar invested.

SURE, you get up to 10% more cars for your money, up to 10% more car availability, and hence more freight revenue per car dollar invested with low-cost solid bearings. But there are many other inherent advantages, too. Let's take a quick look.

1. Unrestricted as to Speed and Load

Steel, stone, ore—you can take the biggest loads with solid bearing cars—right up to axle capacity. Solid bearings reduce these maximum loads to about 700 psi—well within bearing and oil film capacity. (Compressive strength of the babbitt at highest normal temperatures is over 7200 psi.)

What about speed? Oil film pressures increase with speed. You get a thicker film of oil that more than compensates for any viscosity change. *With solid bearing cars you're actually better off in the higher range of freight train speeds.*

2. Ease and Simplicity of Maintenance

The AAR journal bearing assembly is a simple standard. Internal parts can be easily inspected or removed—without special tools or equipment, with the minimum of effort and time.

There's no need for expensive shop facilities or skilled labor. Stocking of parts is simple and replacements are available at any repair point of any line. And unlike other bearing types, in the event of road failure you can almost always make necessary repairs and bring a solid bearing car in on the same wheels.

3. Greater Protection for Lading

With solid bearings lading gets the smoothest possible ride on standard freight car trucks. That's because lateral shocks are flexibly controlled — not rigidly opposed. This means less wear and tear on car bodies, trucks, wheel flanges and rails, too!

4. Weight and Resistance Advantages

In motion the solid bearing glides on a film of oil like a skater on ice. Dynamic resistance is as low or lower than that of any other type of bearing — averages less than one pound per ton regardless of the outside temperature or speed of operation.

Solid bearings also save many tons unsprung dead weight on every moving train. Lighter weight, plus lowest possible resistance in pounds per ton, puts the maximum tractive effort of the locomotive to the business of moving goods.

5. Improved Dependability in Freight Service

Solid bearing performance is getting better all the time. In 1954, there was only one set-off for every 15 cars—equivalent to each car operating 15 years per road failure of a bearing. And this average car was almost 20 years old. You can bet that other bearing types would have a tough time trying to beat that record.

Better still, means are now available to reduce journal box servicing requirements and get still better solid bearing performance. Improved bearings and lubricators are now being installed. Periodic servicing—on a calendar basis—and 3-year repacks will not be far behind.

You save money in many ways with solid bearing cars, and you will save even more in the future. With so many inherent advantages, you just can't beat solid-type bearings for railroad rolling stock!

Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

Diesels Are Showing Their Age

ICC inspections reveal "deterioration" in locomotive fleet reflected in more defects and in more units ordered out of service.

Nearly eleven per cent of the diesel units inspected by ICC inspectors during the year were found defective, and the number of units ordered out of service jumped from 127 to 492 according to the 1956 report of the ICC's Director of Locomotive Inspection. Tougher federal inspections and failure of railroads to keep their aging motive power in "like new" condition are playing a part in the poor results.

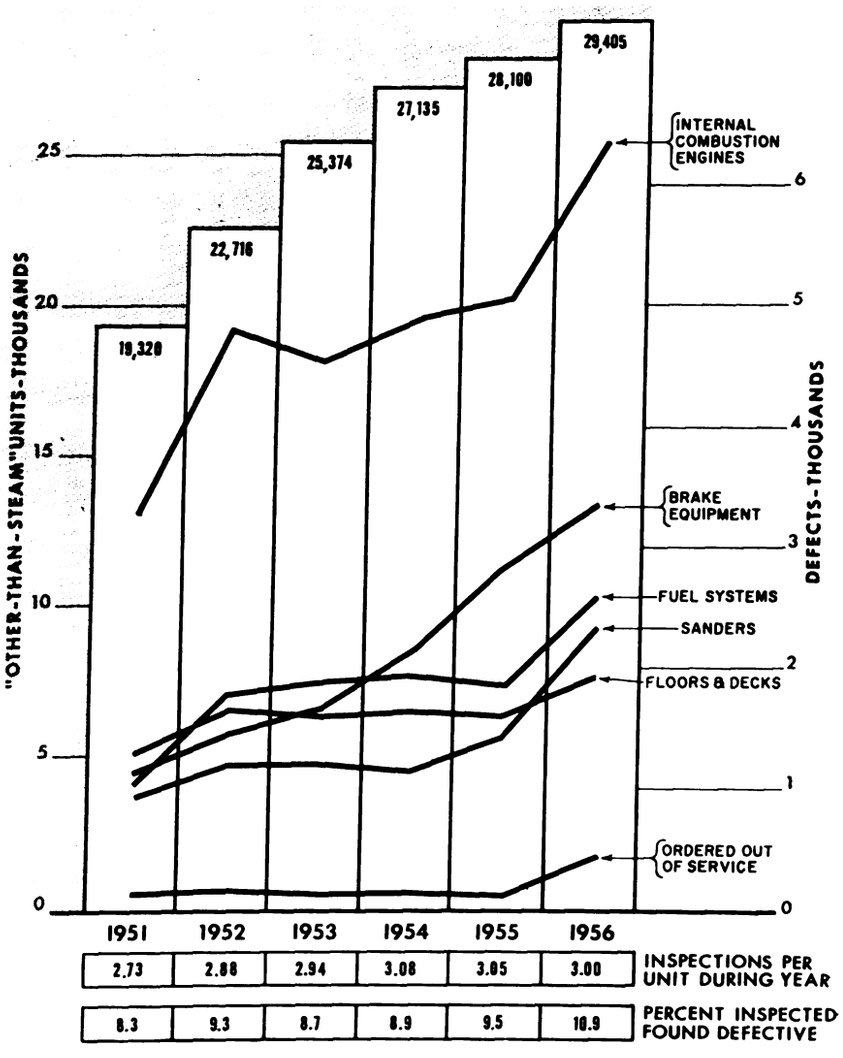
The 45th annual report has summarized much of last year's work by stating that "the increase in the number of locomotives found defective, the number of defects found, the percentage of inspected locomotives found defective and in the number ordered out of service is a reflection of the deterioration resulting from increasing age of the now predominating diesel power."

Accidents decreased 12 per cent and injuries dropped 44 per cent. A year ago a locomotive wheel failure in passenger service accounted for a large number of non-employee injuries. No such accidents occurred in the past year, and there were no injuries to non-employees.

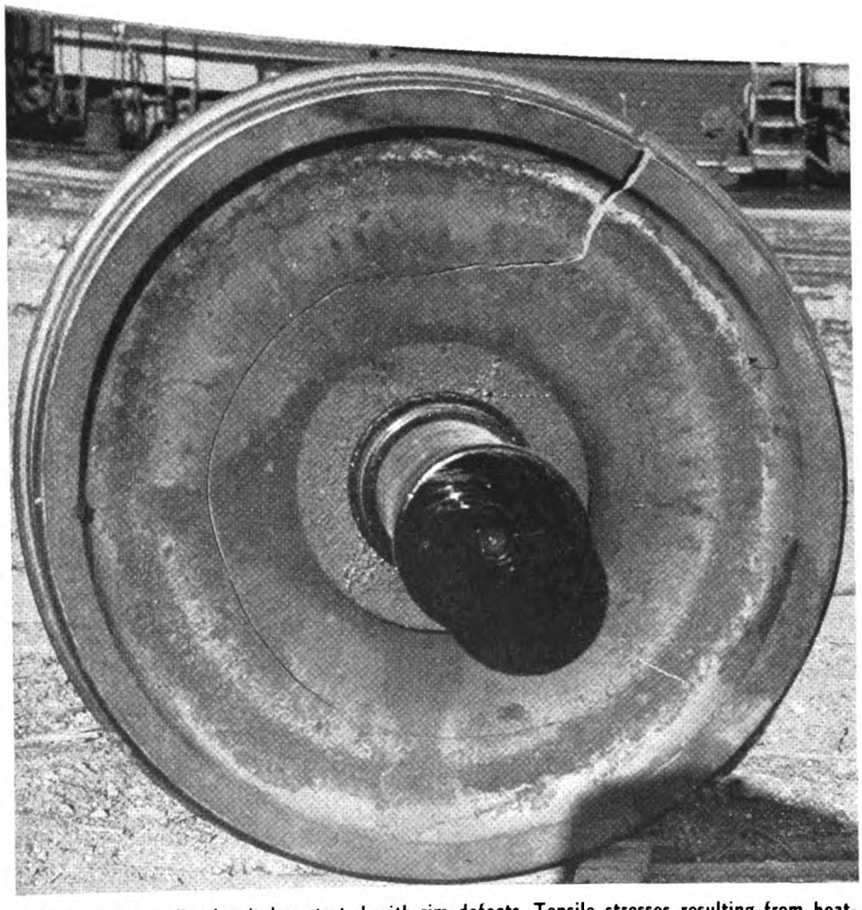
Inspectors' Conferences

For the past three years the number of units inspected by each inspector has remained about constant, but the director's report indicated that insufficient travel funds did not allow district inspectors to travel throughout their districts so that outlying terminals were not visited with the same frequency as in the past. This non-uniform enforcement pattern has now been changed because additional travel funds were appropriated for fiscal 1957. "Neglected" inspection points can now be covered.

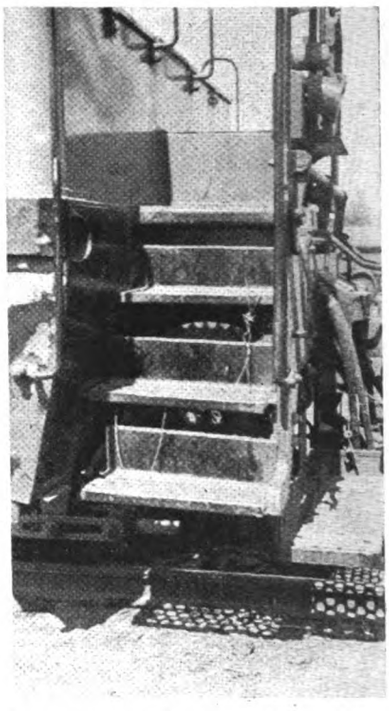
J. A. Hall, Director of Locomotive Inspection, reported that during the year conferences were held at convenient locations between offi-



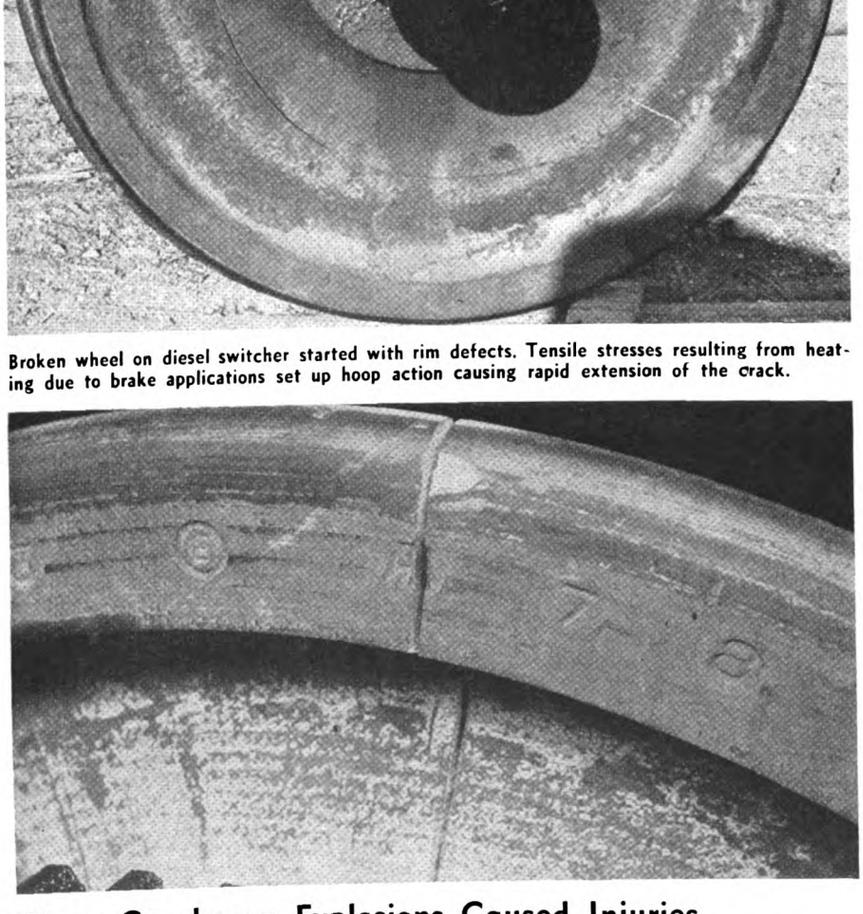
Other-than-steam ownership went up little last year but defects and ordered-out-of-service figure jumped sharply upward. ICC has not been able to increase the frequency of inspections.



Broken wheel on diesel switcher started with rim defects. Tensile stresses resulting from heating due to brake applications set up hoop action causing rapid extension of the crack.



Steps separated from supporting attachments and wired in place caused diesel switcher unit to be ordered out of service by district inspector when condition was discovered.



Stencil mark on the inside face of the wheel rim of a diesel electric road unit was the source of a failure that then progressed through the flange and also toward the hub of the wheel.

These Crankcase Explosions Caused Injuries

• Crankcase explosion on June 29 resulted from an overheated bearing. Water leaking at lower liner seal. Lower tangs of No. 2 main bearing sheared off which permitted bearing to rotate 90-deg shutting off oil lubrication. "No. 2 engine used 6-in. of water in 3 hours" was reported June 22. "No. 2 engine using water" was reported on June 23 and 24.

• Crankcase explosion on November 19 was caused by overheated crankshaft bearings. Filter elements were coated with heavy slude and lubricating oil pressure regulating and relief valve was prevented from seating by particles of flaked carbon lodged between it and the body seat.

• Crankcase explosion on October 9 resulted from an overheated bearing. One injector was defective and did not properly atomize the fuel oil. Exhaust valves of five cylinder were leaking freely and permitted unburned fuel to pass into the crankcase.

• Crankcase explosion caused by overheated main crankshaft bearings. Low oil pressure and high oil pump suction shut down switch of engine governor inoperative. No. 8 fuel injector leaked at seal ring.

• Crankcase explosion on December 20. Surface of the main part of left No. 2 piston was very rough. Cap, compression rings, upper oil ring and top oil ring on skirt were missing.

• Crankcase explosion on October 22 was caused by a defective and overheated piston. The piston had a large hole in its crown and the liner was excessively scored.

• Crankcase explosion on November 22 resulted from an overheated bearing. One or more lower liner seals were defective and the engine lubricating oil had a high percentage of water contamination.

Where Are ICC Defects Being Found on Diesel and Electric Locomotives?

(Partial List of Defects)

	1956	1955	1954
Air compressors	443	419	326
Boilers	275	203	175
Brake equipment	3,259	2,790	2,126
Cabs and cab windows	1,600	1,073	858
Cab floors, aprons and deck plates	1,933	1,677	1,703
Controllers, relays, circuit breakers, magnet valves, and switch groups	775	802	454
Coupling and uncoupling devices	166	204	139
Draft gear	360	336	291
Driving boxes, shoes, and wedges	291	249	154
Fuel system	2,555	1,833	1,951
Gages or fittings, air	278	226	136
Handholds	258	219	230
Internal-combustion engine defects, parts and appurtenances	6,356	5,035	4,848
Jumpers and cable connectors	553	214	178
Motors and generators	1,122	880	813
Sanders	2,307	1,492	1,200
Springs and spring rigging, driving and truck	363	306	241
Steps, footboards	1,005	737	622
Trucks	1,007	1,054	503
Wheels	252	282	257

What Do ICC Inspectors Find?

LOCOMOTIVES OTHER THAN STEAM

	1956	1955	1954
Number of defects	29,054	22,618	19,640
Locomotive units reported	29,405	28,100	27,135
Locomotive units inspected	88,269	85,897	83,338
Locomotive units defective	9,597	8,129	7,395
Percentage of inspected found defective	10.9	9.5	8.9
Locomotive units ordered out of service	492	127	140

STEAM LOCOMOTIVES

Number of defects	6,487	7,350	9,763
Locomotives reported	5,875	8,892	12,135
Locomotives inspected	8,794	12,128	19,999
Locomotives defective	1,499	1,784	2,599
Percentage of inspected found defective	17.0	14.7	13.0
Locomotives ordered out of service	152	96	117

Accidents and Casualties Caused by Failure of Locomotive Components

	1956		1955		1954	
Number of accidents	73		83		105	
	Killed	Injured	Killed	Injured	Killed	Injured
Members of train crews:						
Engineers	1	19	1	26	1	37
Firemen	2	38	1	34		39
Brakemen	1	10		10		11
Conductors		8		4		4
Switchmen				4		3
Maintenance employees		2	1	4	2	12
Other employees		2		18		2
Nonemployees				42		194
Total	4	79	3	142	3	302

cials of the Bureau of Locomotive Inspection and district inspectors. Policy, uniform inspection and enforcement procedures, individual inspection problems, and new locomotive designs were discussed.

All district inspectors are advised of details and causes of unusual accidents to better assist in their educational contacts with railroad personnel. Monthly current-activities bulletins covering investigations are forwarded to district inspectors.

No carrier filed any appeal from the decision of a district inspector during the year when six cases involving 117 counts for alleged violations of the Locomotive Inspection Act were transmitted to U. S. attorneys for prosecution.

Multiple-unit electric cars were made subject to the Locomotive Inspection Act on April 1, 1956. "Rules and Instructions for Inspection and Testing of Multiple Operated Electric Locomotive Units Designed to Carry Freight and/or Passenger Traffic" have been issued. Because specifications for these m-u cars had to be filed when they were brought under jurisdiction of the Director of Locomotive Inspection, the total number of "locomotives" reported increased for the first time in many years.

The number of steam locomotives reported continued to decline rapidly. However, all four fatalities occuring on locomotives during the year were due to two steam locomotive boiler explosions. This followed the year 1955 when the director could report that for the first time since passage of the Locomotive Inspection Act there had been no boiler explosions.

The greatest number of injuries resulted from accumulations of oil on floors, decks and steps of diesel locomotives. The ICC had emphasized this a year ago when it promised a crackdown on locomotive "housekeeping". Reported in 1956 were 22 such accidents on diesels. In eleven of these, oil accumulations had been reported from 4 to 29 times prior to the accident. Failure to correct such conditions indicates a "laxity in observance of basic safety essentials," according to the director of locomotive inspection.

The report continued "Because each oil hazard is a potential source of a disabling accident, district inspectors have been instructed to give close attention to this type of defect particularly on railroads where this condition is prevalent."

Seven crankcase explosions resulted in injury to nine persons. Two of these were caused by defective pistons and the remainder were caused by overheated bearings resulting from lubrication failures. Injuries from cab seat failures dropped from eight to three last year and credit is taken for the "surveillance exercised by district inspectors."

A total of 88,269 inspections were made on the 29,405 "other-than-steam" locomotive units during the year. On these units 9,597 defects were found—10.9 per cent. Principal defect classifications in declining order were (1) internal combustion engines, (2) brake equipment, (3) fuel systems, (4) sanders, (5) cab floors, aprons and deck plates.

Two 8-ft doors on each side of CNR "all-purpose" box car cover doorways which can be 15-ft 8-in. wide. Experimental conversion was made from a standard 40-ft 6-in. box car.

CNR Goes All Out For An All-Purpose Box Car

Seeking a real all-purpose box car, research engineers of the Canadian National Railways have spent two years designing, constructing and testing a prototype car with door openings which can be altered from 5-ft 8-in. to 15-ft 6-in.

Engineers devised several alternate designs before selecting the arrangement finally incorporated into a standard box car for the tests. North American railroads have been puzzling over box car door sizes for some years. Each shipper has his own peculiar requirements depending on the type of product or material he wants to ship. What suits the grain shipper is hopeless for the auto shipper. What the canned goods shipper wants doesn't suit the shipper of plywood.

Mechanization of loading and unloading has played a large part in these specialized requirements. The shipper using fork-lift trucks is not satisfied with a 6-ft opening, but wants a doorway that fork-lifts can enter with ease, even carrying 4-x 8-ft plywood sheets.

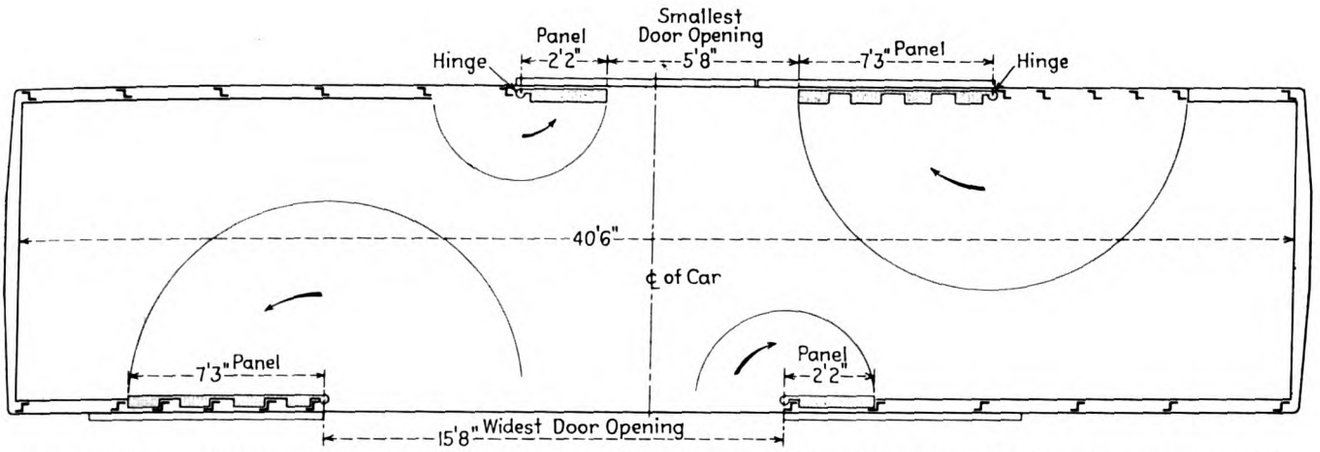
There are railway requirements that come into the picture. For bulk shipments, the 6-ft door is still best. Grain, which in 1955 formed 11.9 per cent of total CNR tonnage requires that wooden grain doors be placed inside the car across the door opening to prevent leakage. CNR has an investment of $1,500,-000 in such grain doors, all designed to fit the 6-ft opening. Tne normal replacement rate would allow a complete change to a different size in five years, but the larger doors would cost more.

Recently the New England Shippers' Advisory Board made a survey among members to determine their preferences for the dimensions and capacity of the ideal box car. The data would be similar if it were summarizing the requirements of Canadian merchandise shippers. An extract from this regarding door openings is shown below.

Most merchandise shippers preferred door openings at least 8-ft wide. Presumably they would be satisfied with anything wider. Some would like to have the whole car side removable.

These considerations indicated to CNR engineers a convertible car. Their first idea was a 12-ft opening with a movable post in the center. This would require the use of two 6-ft grain doors on each side of the car and would double the expense of grain doors in making the car acceptable for grain service. The double expense in grain doors along

Width of door (ft)	Preference by shippers of following number of carloads	Percentage of Preference
5	26	.2
6	1,787	17.0
7	997	9.5
8	6,218	59.1
10	1,221	11.6
12	276	2.6



Plan of "all-purpose" car shows how the two side doorway widths are produced with swinging panels. Car is being tested in services which require both side opening widths.

with the increased inventory, and the difficulty encountered in making the two sets of grain doors tight and leakproof seemed to make this design unsuitable. Removal of the movable center door post in a 12-ft opening would make the car meet the requirements of merchandise shippers. However, this car would not suit automobile shippers, because the 1957 models cannot enter through a 12-ft doorway.

Thought then turned to sliding wall panels, and plans were prepared for several variations. Panels were designed to slide on the outside of the car, to slide inside the car and to slide within the side walls. They were to be supported on rails, either at the top, or at both top and bottom. These plans were discarded because of the complex mechanisms necessary to move and support the panels, and the difficulty in making them weathertight.

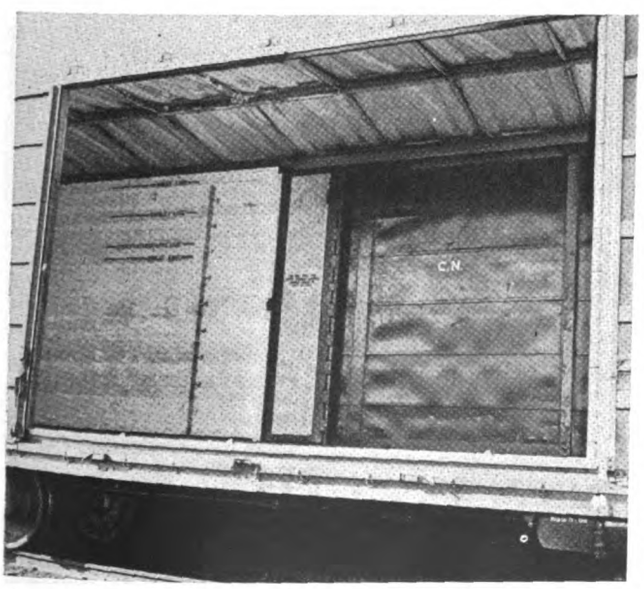
CNR engineers came to the conclusion that the simplest, most practical means of moving the panels was to hinge them. Plans for this arrangement were prepared, and a standard 40-ft 6-in. box car was remodeled with folding wall panels.

A 15-ft 6-in. door opening was made in the side and covered on the exterior by two 8-ft sliding doors. This large opening is off the center of the car—the same arrangement which is standard for auto box cars. On either side of the opening is a hinged panel—one over three times wider than the other. When they are swung to the closed position, the small door opening is centered in the car side and is only 5-ft 8-in. which is then suitable for grain loading. Folded back, the panels recess into the car's fixed walls. They are supported on floor-to-ceiling piano hinges.

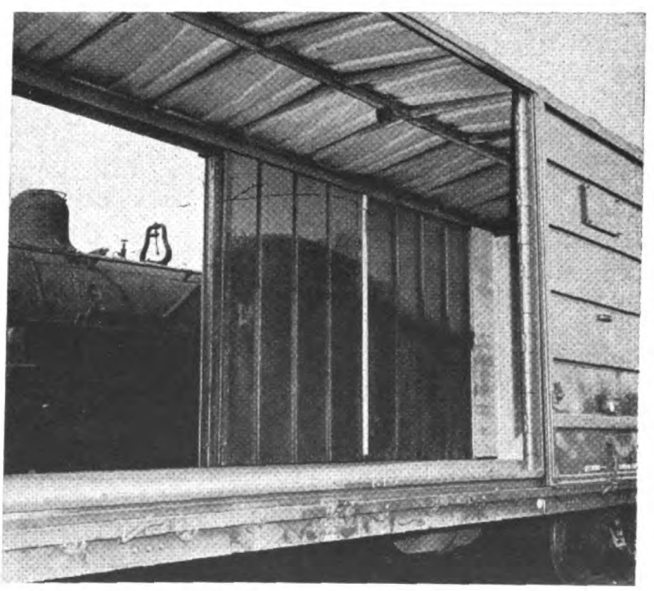
Work on the designs was started in 1955 and the prototype was completed in May, 1956. A committee of CNR traffic operating, car service and research people was set up to conduct tests with the car in different types of service.

The following shipments were chosen: china clay, grain, automobiles, lumber, newsprint, sugar in bags, woodpulp in bales, veneer, aluminum ingots and canned goods.

The first load to be placed in CNR 590575 after alterations was



Narrow 2-ft 2-in. wide plywood-faced panel folds into the car's side wall to produce wider doorway opening. Car's two side openings are staggered in automobile car style.

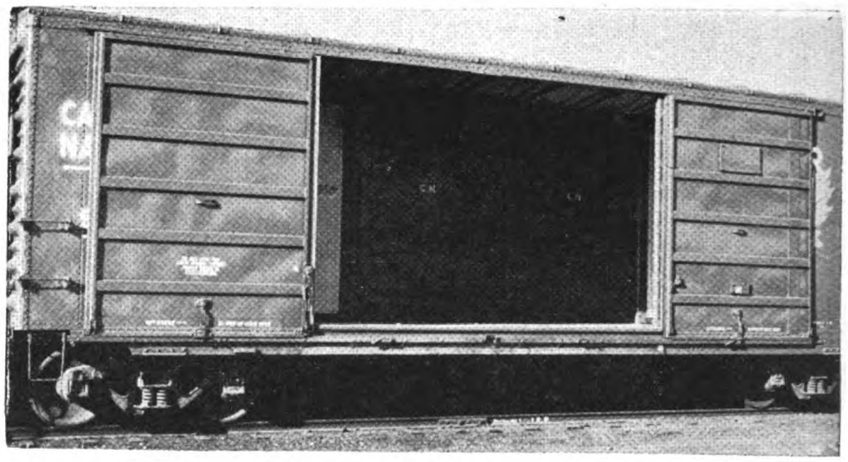


Wide panel of 7-ft 3-in. width has been swung out to give small door opening. Panel is "grooved" to fit around side posts. All panels have piano style hinges.

china clay consigned from Montreal to St. Johns, Quebec. The load arrived at its destination in good condition with bulkheads securely in place and with little leakage. The door opening for this service was closed down to 5 ft 8 in.

In December the car left Midland, Ontario, with its first load of grain for dockside in Montreal. This run was successful; the wooden grain doors remained secure throughout the trip.

The car was placed in LCL service between Montreal and Toronto in January and has been performing satisfactorily. Its next loads will be bagged goods—sugar and flour; then it will handle newsprint.



Side opening is large enough to permit use of the car in automobile service. CNR has just put into service another series of cars designed only for automobile hauling.

Budd Lightweight Now Runs from Pittsburgh to Chicago

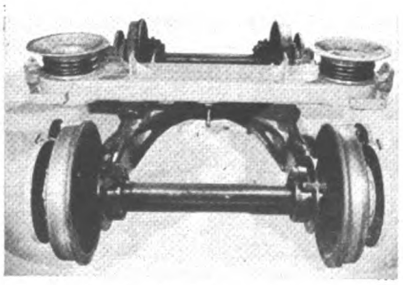
Budd lightweight coach, "Pioneer III" is now operating into Chicago from Pittsburgh on the Pennsylvania. This car is the prototype for cars, now ordered, which will eventually be used in Pennsy's electric m-u operations (see Railway Locomotives and Cars, February, 1957, page 12).

Since the first public announcement last summer, the "Pioneer III" has been operating between Washington and New York as part of the regular consist of the Pennsylvania's tubular "Keystone" trains. During these runs the car accumulated over 55,000 miles of operation, but did not carry passengers because it was always separated from the regular passenger cars of the "Keystone" by the train's power car.

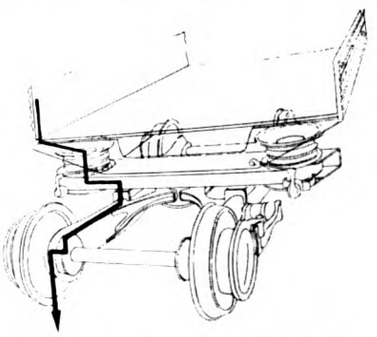
Tests have shown that the radical Budd truck provides riding qualities equivalent to the newest standard coaches on the Pennsylvania, and the noise levels on both types of cars are equal. Road testing has confirmed the theoretical calculations of Franklin Institute's analog computer on ride characteristics.

Complete inspection after over 50,000 miles of running showed negligible flange and tread wear. Only a few changes to simplify inspection and servicing were made before the car went back on the road to accumulate more mileage—now from Pittsburgh to Chicago.

"Pioneer III" was hauled between PRR GG-1 and tubular power car of "Keystone" to accumulate mileage between New York and Washington.



Budd truck has air springs and total weight of 6,600 lb.



Load paths do not go through the center plate; simplify structure.

1957 Interchange Rules Have Changed

A smaller book of Interchange Rules and simplification of billing may be the next important advances in interchange—the field which is of uppermost concern to all railroad car departments and private car line operators. An AAR representative recently told of the work of an AAR committee which is studying the simplification of interline billing. It is intended to eventually reduce the coupler prices now listed in the interchange rules down to four or five. Journal box lid prices would be averaged to produce one price for 9-in. lids, one for 10-in. lids, etc. Changes such as this, and other revisions, should cut the present rule book from its 400 pages to about 250 pages. One result should be to make it possible to develop a billing clerk "in six months instead of six years."

The annual review of the interchange rules revisions was presented to the Eastern Car Foreman's Association at the February 8th meeting by L. T. Donovan, Assistant to Executive Vice Chairman, AAR. The New York group has made this summary of rule changes a regular part of its yearly program for many years. Mr. Donovan called attention to "a number of very important changes and additions." Labor and material charges have continued to rise and have a bearing on much of the interline billing. Committees of the AAR Mechanical Division have revised specifications and diagrams and these activities have resulted in minor changes in some rules.

Mr. Donovan discussed the development of the Interchange Rules from the first agreements made during the 1860's when railroads first began to interchange cars. He predicted some probable changes to be made in the present rules, and indicated those changes which have been made and which are considered of particular importance. These important items are marked by bold squares ■.

Rule 2

■ **Section (b)** was modified to indicate that further information on the handling of leaking tank cars is contained in Bureau of Explosives Pamphlet No. 22.

Section (d-1, -2, -3) was changed to provide that restrictions on acceptance of refrigerator cars equipped with portable or permanent heaters in interchange would be applicable to any car with such heaters.

■ **Section (e)** (new) was added to cover mechanical refrigerator cars with mechanical units not operating, or not operating properly, to indicate that handling must comply with National Perishable Freight Committee Circular 20-D, Rule 222-A. Former Paragraph (d-4) became Paragraph (e-2) and former sections (e) to (j) were relettered (f) to (k).

■ **Section (h-4)** modified to provide that health benefit expenses would be applicable to bills covering work in transfer or adjustment of lading.

Rule 3

Section (a-5) modified to permit the use of extra heavy nipples at angle cocks when desired.

Section (r-8) had Note 1 modified to permit substitution of wood in place of metal for dome platforms and dome steps of tank cars carrying corrosive commodities, and had Note 2 modified to provide additional approved types of metal running boards.

■ **Interpretation 1** was revised to conform with AAR Tank Car Specification and ICC regulations.

Effective January 1, 1957, the following became mandatory:

Section (b-7) requiring metal brake lever badge plates on all cars from owners.

Section (g) (new) added to require that all new box cars will have flooring with minimum thickness of 2⅜-in., and at least three 6.7-lb Z-section floor stringers (or equivalent) on each side of the center sill.

Section (t-3-b) prohibiting cast steel truck side frames having I, T, or L section compression or tension members under all cars in interchange service.

Effective August 1, 1957, the following will be effective:

■ **Section (j-3)** requiring approved journal lubricators on all plain bearing cars built new, rebuilt, or receiving heavy repairs. Requirement will be effective on all cars in interchange on January 1, 1960.

Section (s-3) requiring that automatic slack adjusters on cars must be AAR approved (date extended from January 1, 1957).

Effective dates for following sections have been extended one year to *January 1, 1958.*

Section (f-3) requiring lading strap anchors on flat cars.

Section (w-4) prohibiting cast iron wheels under 70-ton covered hopper cars.

The following will become *effective on January 1, 1958:*

Section (r-5) requiring the use of non-combustible insulation in new and rebuilt refrigerator cars.

Section (t-2-a, -b, -c) requiring the use of approved designs of truck side frames on new cars.

■ **Section (w-5)** prohibiting the use of cast iron wheels on cars built new or rebuilt.

Rule 4

Section (f-3) modified to permit the application of 2-in. load securement bands.

Rule 17

Section (e), Note 3 has had the third paragraph modified to indicate only scrap credit is to be allowed for chair castings removed in connection with exchange of No. 18 brake beams.

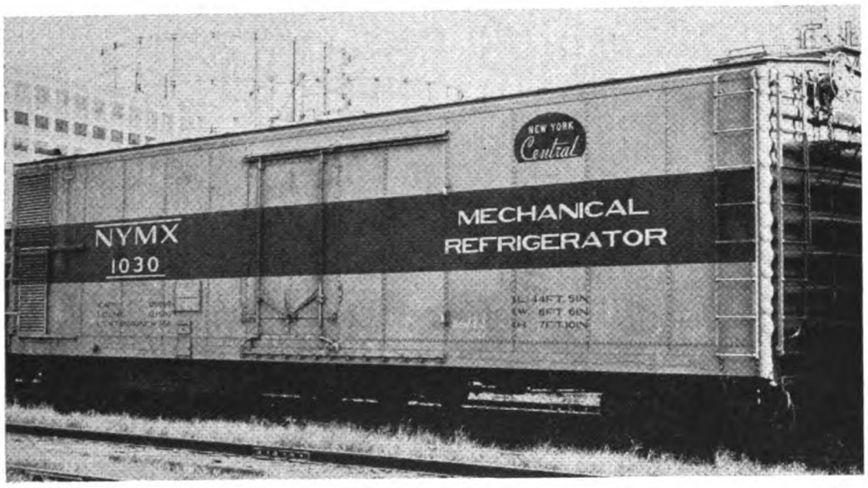
Section (i) modified to include new types of approved draft gears.

■ **Section (r)** permits substitution of any approved design of metal running board or brake step, where suitable.

Interpretation M-13 was added in order to establish a uniform method of preparing billing for repairs made to mechanical refrigerator cars and for the disposition to be made of parts removed.

Rule 24

The entire rule has been modified and a new **Figure 4** added to permit application of liners to the worn ceiling of journal boxes.



Rules because there are now more than 2,000 mechanical reefers in service such as this New York Central car completed last year.

Handling in event of failure under load, procedure for billing and handling of repair parts, and a specification of the proper diesel fuel all had to be added to the Interchange

Rule 28

This is a new rule added to specify the proper diesel fuel for use in mechanical refrigeration units to prevent failures. Fuel oil called for is an ASTM 1-D fuel, and "some grades of kerosene will comply with these specifications."

Rule 32

■ **Section (12-b) Note 2** was modified to indicate that a change is permissible on actual cost basis for elimination of contamination by washing, steaming, sanding, etc.

Rule 60

Section (n), Note 1 (new) was relocated from **Section K** to clearly indicate that provisions contained therein on stencilling after brake tests are applicable to all types of air brakes.

Section (1) Note 8 (new) was added to insure cleaning of brake cylinder release valve when brakes are C.O.T and S.

Rule 61

Paragraph (c) was modified to insure proper cleaning and lubrication of center plates in accordance with intent of the rule.

Rule 63

Paragraphs 3 and 4 were modified, to reduce the permissible wear on brake hanger and brake connection pins.

Rule 64

Second paragraph modified to require the use of nut locks, lock nuts or unit nuts for securing certain air brake parts to car.

Rule 66

Paragraph (c) pertaining to repack markings was modified to clarify the intent.

■ **Interpretation No. 4** had the third note modified to permit certain applications and clarify the intent of existing notes pertaining to packing retainer devices. New fifth note added to provide for a newly approved design of packing retainer device.

Rule 67

■ This rule was changed with regard to the height of body or truck above top of rail to provide proper clearance over car retarders and other devices.

Rule 70

■ Modifications made throughout the rule because the new Types A and B cast-steel wheels have been adopted as AAR Standard. Similar changes were made in Rules 76, 82, 93 and 101 (Items 193-A and 193-B).

Rule 75

Paragraph (d) was added to more clearly indicate that built up tread on wrought steel wheels is an owner's responsibility and a defect for which wheels may be removed from service.

Rule 85

■ Second paragraph was modified to clarify the intent as to responsibility for roller bearing units including axles. Third paragraph was added to provide for removal of axles having flaws detected by Ultrasonic Reflectoscope when verified by further inspection or tests.

Rule 86

The Table of Journal Diameter Dimensions for Controlled Bearing Clearances had the note following modified to clarify the intent.

Rule 93

First requirement of third paragraph modified to eliminate the necessity for showing totals for each month's billing separately when no price changes are involved.

Rule 96

This was modified to permit a method of group billing for roads desiring to use it in the interest of simplification.

Rule 98

■ **Paragraph (8)** (new) added to expedite the removal of cast-iron wheels from 70-ton covered hopper cars without undue expense to foreign roads which are obliged to handle these cars.

Rule 101

■ A number of price changes have been made because of material quotations and the increase in labor rates from $3.80 to $4.05 an hour which affected all combination labor and material items. Changes were made in several sections dealing with items recently given approval or now obsolete. These include dirt collector and cut out cock, pipe fittings, cast-steel wheels, brake beams, draft gears, hand brakes, journal box lids, brake beam safety supports, and packing retainers.

Items 119 to 125 had new note added to indicate that the price shown includes coupler equipped

with E-24-A bottom rotary lock lift. When coupler applied is equipped with E-6-A top lock lifter or E-14-A bottom lock lifter, the price must be reduced by a specified amount.

Items 136 to 136-G. New items and note added in table form to provide allowances for Type E coupler parts.

Item 193 modified to indicate it refers to Davis cast-steel wheel.

Rule 107

All combination labor and material items modified account recent increase in labor rates.

Item 2 new note following added to establish uniform method of billing for repairs to mechanical refrigeration units and disposition of parts removed.

Item 45 modified to permit additional charges for necessary pipe connections.

Item 78 second note following modified to indicate charge also applies to floor protection plate bolts which do not secure flooring to car.

Item 156 new first note added to provide extra labor allowances where packaged type springs are involved.

Item 168 new last note added to provide additional labor charge for changing wheels where journal boxes are equipped with R-S journal stops.

Interpretation No. 12 was modified to clarify the intent as to disposition to be made for overlap labor charges for repairs made in cases of divided responsibility.

Rule 108

Section (B) Item 7 was modified to permit charge for labor and material involved when seal hook, pin or chain (any or all) is welded to car.

Rule 111

All combination labor and material items modified account recent increase in labor rates and material prices.

Rule 112

■ **Section B** per pound prices in tables under Paragraph (1) and (9) modified with new per pound prices incorporated in Paragraph (9) for insulated tank cars. Paragraph (5) modified to provide basis for settlement of mechanical refrigerator cars equipped with beef rails, as shown in Supplement No. 1 to the 1956 Code. New Note (4) added to provide settlement basis for outside heater coils applied to tank shell of tank car by fusion welding. Paragraph (10)(c) of Section B modified to provide for additional allowances for roller bearing assemblies in settlement for destroyed cars. This paragraph further modified to provide additional allowances for AAR cast-steel wheels.

■ **Sections (E), (F), (G) and (H)** modified to harmonize with ICC Regulations as modified effffective January 1, 1955 with some sections expanded and some paragraphs relocated to develop proper sequence and to more clearly indicate the intent.

PASSENGER CAR RULES

Rule 2

■ **Section (j)** was modified by extending effective date to January 1, 1958, in order to prevent hardships on roads which have not completed program of replacement of Pitt type couplers.

Rule 7

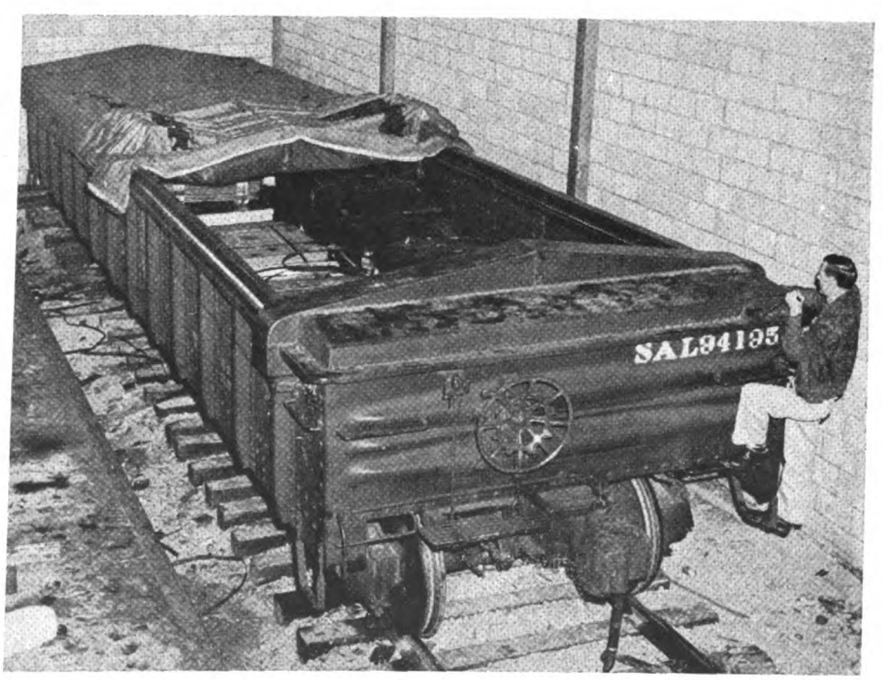
Section (e-4) was modified to clarify the intent of responsibility for failure of roller bearing units including axle.

Rule 21

All combination labor and material items were modified because of recent increase in labor rates. **Item 27** was modified to clarify the intent regarding charges for roller bearing units disassembled and assembled.

Rule 22

All combination labor and material items modified because of recent increase in labor rates. Other items modified account increase in material prices. **Item 51** was eliminated because 36-in. cast-iron wheels are no longer being manufactured.



Seaboard Has "Tarp-Topped" Gondola

To provide for rapid loading and unloading of sheet steel, the Seaboard has equipped one of its 50-ton, low-side gondolas with a special cover of heavy rubberized fabric supported by metal hoops. This cover is hand-cranked back and forth over the cargo space. Cover was designed by the American Forge & Manufacturing Co.

Subway Air Conditioning Gets Green Light

H & M made two test installations to find the answers from operating and passenger standpoint

A recent joint purchase by the Pennsylvania and Hudson & Manhattan railroads will put fifty new air-conditioned cars into rapid transit service between New York City and the New Jersey cities of Newark, Hoboken and Jersey City.

Last summer H&M made installations to determine the feasibility of air conditioning rapid transit cars in subway service. This was an effort to see what could be done to increase summer passenger comfort and to win back operating revenue lost to bus transportation and parking facilities.

Late-summer operation indicated that air conditioning of transit equipment was practical. Two companies were asked to submit designs—the Trane Company and Safety Industries. Both systems are true air conditioners. Each has a compressor, evaporator, and a duct system; the recirculation of existing air had proven ineffective in the past.

Two cars, at the time of their regular periodic overhaul, were fitted with this experimental equipment. No. 438 was equipped by Trane and No. 439 by Safety.

Several problems had to be solved. The car had to adjust itself to both constant and rapidly changing occupancy and at the same time provide uninterrupted cooling while idling or operating at low speeds. The following are descriptions of these two trial cars as they now exist.

Car No. 438 (Trane). Designed by Pullman-Standard and engineered by Trane, this system meets the demands of peak, rush hour loads by teaming up a cooling unit with an undercar compressor-condenser. The cooler has a direct expansion refrigerant coil feeding a series of fans.

In operation the system is started by a manual fan switch. When car temperature exceeds 76 deg F, the thermostatically controlled unit goes on and the recirculating fans run at a minimum speed. Car temperature controls the fan speed from a minimum speed at 76 deg F to a maximum at 82 deg F.

Outside air is chilled. Circulation begins as the centrifugal fans draw outside air through louvers set flush in the exterior car frame. These pull a constant volume of outside air—1500 cfm—into the car. Immediately upon intake, the air is filtered and enters the fan plenum chamber. From here the air passes over the evaporator coil and is chilled to a predetermined temperature. This chilling results in maximum dehumidification, keeping the humidity at a comfortable level even when the car is fully loaded.

Conditioned air is distributed the length of the car by two ducts. Recirculating fans draw the conditioned air from the supply ducts through inlets into a central chamber. At the same time recirculated air is being drawn through the ceiling grilles located between the fans. The two air streams are thoroughly mixed by the fan blades before entering the car.

Each of the five fans will handle a maximum of 1,000 cfm. . . . 250 cubic feet of conditioned air and 750 cubic feet of recirculated air. At maximum speed, a total of 5,000 cfm of air is discharged from the fans.

The undercar compressor-condenser unit consists of an angle frame on which is mounted a 7-ton, compressor, a condensing coil and a 10 hp d-c motor with a double extended shaft which drives the compressor and an axial type condenser fan. Included in this assembly are the liquid receiver, strainer, and refrigerant valves.

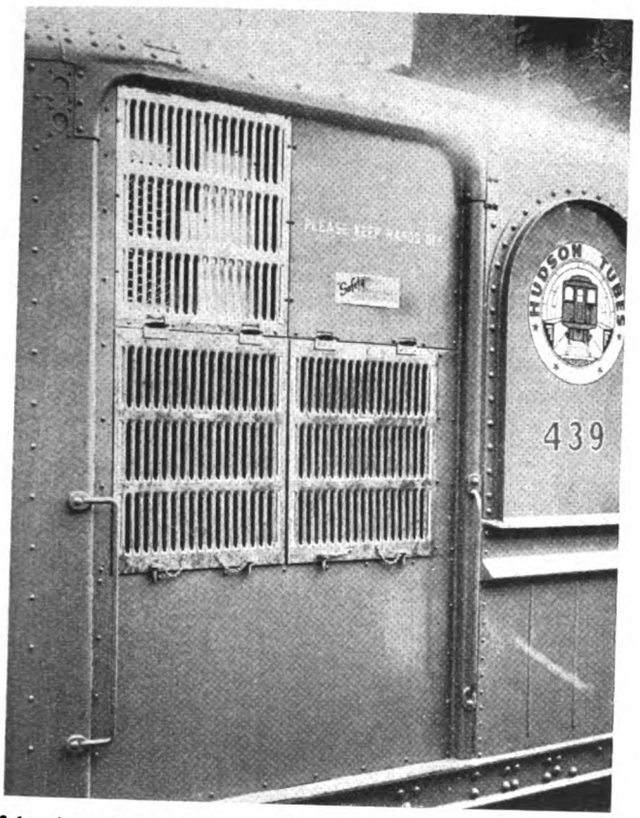
The overhead cooling unit is a blow-through type with two eight in., single width, centrifugal fans, directly driven by a ¾ hp, 1850 rpm fan motor. A special high capacity, direct expansion, refrigerant coil supplies the cooling. An insulated double drain pan provides positive condensate drainage.

Car No. 439 (Safety Industries). The air conditioning equipment on car No. 439 was designed and built by Safety Industries, formerly the Safety Car Heating and Lighting Co. No. 439 was equipped with a packaged air conditioner rated at eight tons under A.S.R.E. conditions. In operation it has developed as high as 10 tons of cooling. All components are assembled, piped and wired in the package. The motor compressor, using a Safety 600 volt railway motor, drives a Carrier Type 5F40 compressor, and is mounted in the lower section of the unit.

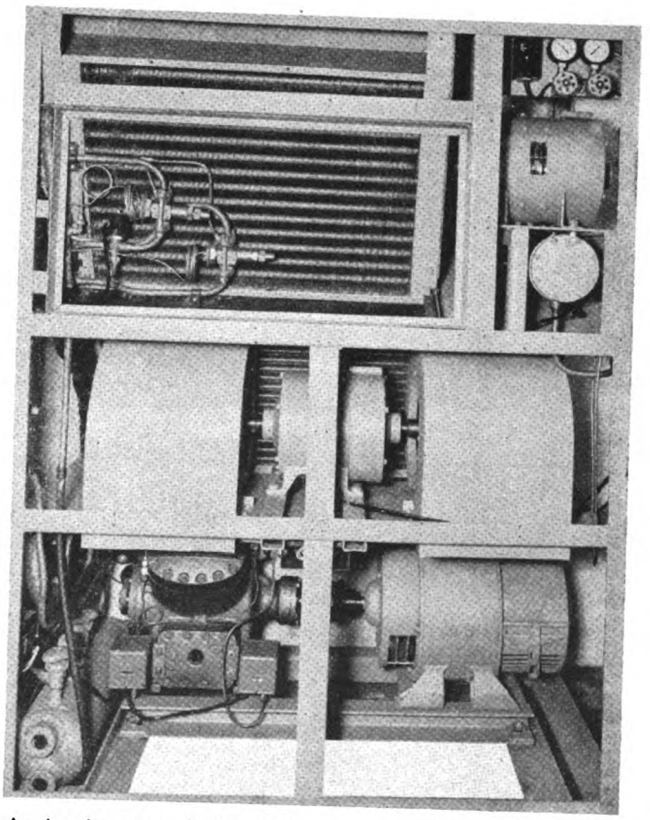
The floor under the unit has been cut out for the condenser air discharge. The condenser coil is housed above the motor compressor unit. Over this is the evaporator section with two centrifugal pull-through blowers feeding a common-center, ceiling mounted, supply duct running the length of the car.

Two rows of air distributors direct the conditioned air. The return air grille is located on the air conditioning unit on the side facing the

Original equipment before any air conditioning had been considered.

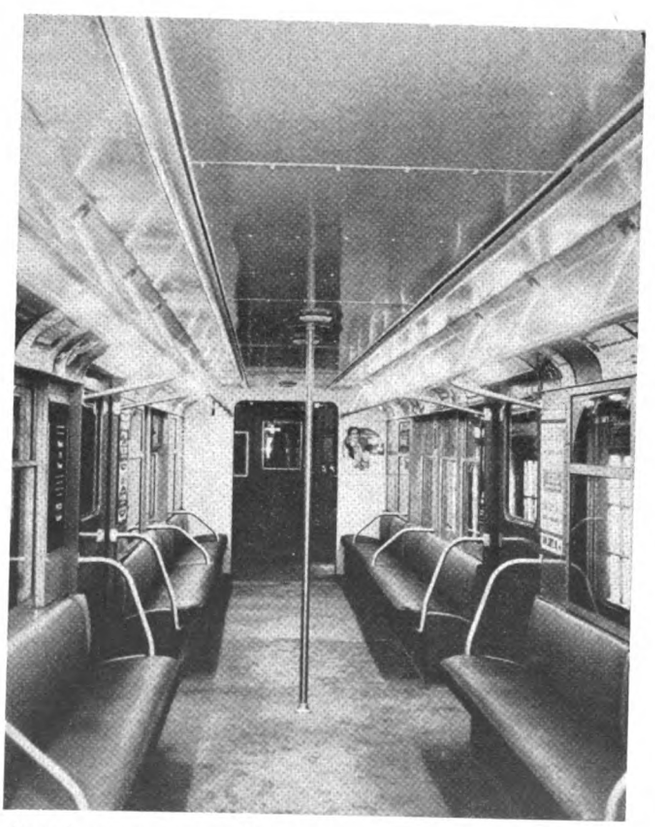


Safety Industries modified one side of the vestibule to accommodate the condenser and fresh air intake grilles.



An interior view of the safety equipment with the cover panel removed illustrates the components in a package.

Boxed recirculating air fans and the intake grilles between them show the Trane approach to the railroad specification.



Safety's idea is two parallel strips running the length of the car. These are the air distributors of the system.

aisle. Twenty-five per cent fresh air from outside the car is mixed with the recirculated air before passing through the evaporator. Condensate collects in a drip pan and is directed to an opening at the bottom of the unit by a hose.

Both the evaporator and the condenser blower are driven by 600 volt railway type motors. The Vapor Heating Corp. supplies the thermostatic and heat controls included in this design.

Tests were run early in August, during the late morning and the early afternoon while the cars were stored outdoors. On August 10th, the outdoor temperature was 93 deg F (dry bulb) and 75 deg F (wet bulb). Inside the car, before turning on the unit, the temperature was 110 deg F (dry bulb) and 79 deg F (wet bulb). Twenty minutes later the temperature was down to 76 deg F (dry bulb) and 62 deg F (wet bulb). This would indicate that a unit of this capacity is needed to pre-cool the cars within a reasonable time. Actual ambient temperatures encountered in the subway tunnel during August run between 80 and 85 deg F when it may be 90 deg F, or more, on the outside.

The highest temperatures were measured at station stops. Although the recirculated air intake was opposite a door normally open at the stops, the car interior temperature varied only plus or minus two degrees from the preset temperature of 74 deg F. This was the case throughout the rush hour period when 100 to 125 passengers occupied the car.

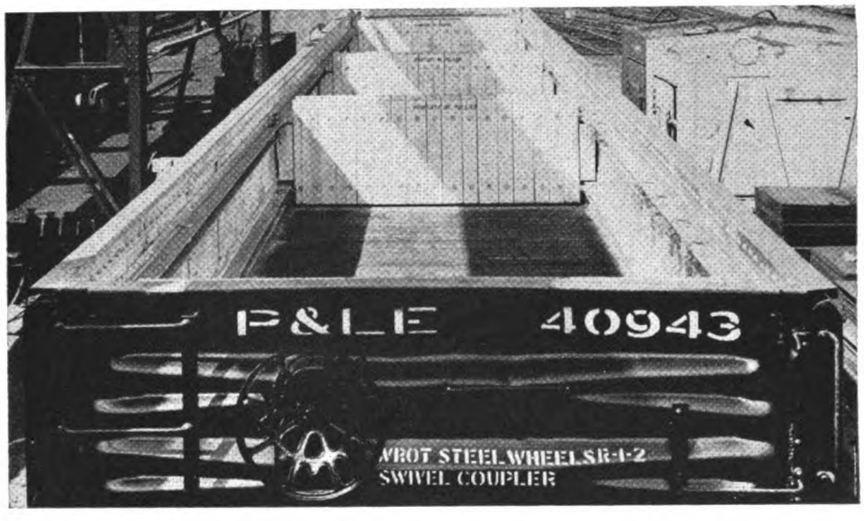
If it is cooler in or outside the tunnels, or if the train is running with only a few people, cooling capacity reduction is obtained by cutting out half of the evaporator coil. The four cylinder compressor immediately unloads its cylinders until the capacity of the compressor balances the load on the evaporator. The proper cooling capacity is automatically provided, resulting in positive temperature and humidity control. The evaporator blower runs continuously furnishing 3000 cfm of cooled, dried, filtered air to the car.

The new cars will have the latest type of air-conditioning equipment which, in addition to circulating thermostatically controlled filtered fresh air cooled in the summer and warm air in the winter, will also eject a sheet of cooled air across all doorways in the summer in order to prevent the entrance of the hotter outside air. The high-tensile, lightweight welded steel car bodies will be mounted on trucks equipped with four 100 hp motors driving silent, automotive-type, hypoid gears running in oil to permit faster operation and reduce vibration and noise.

Pastel hues and modern lighting fixtures in car interiors with 48 seats upholstered with foam plastic will be introduced. The insulated floors will be covered with vinyl asbestos tile to reduce vibration and noise. There will be permanently sealed, safety glass picture windows.

The new cars will be 51 ft long, three feet longer than the present ones and are to replace equipment which is mostly 44 to 45 years old, although a few are 29 years old.

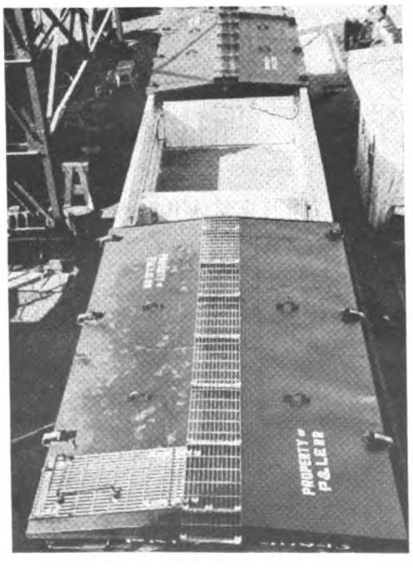
An air-conditioning system, similar in principle to the Safety installation on original test cars, has been selected for cars on order.

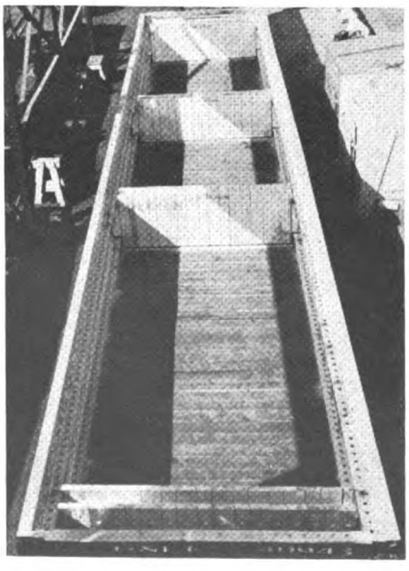


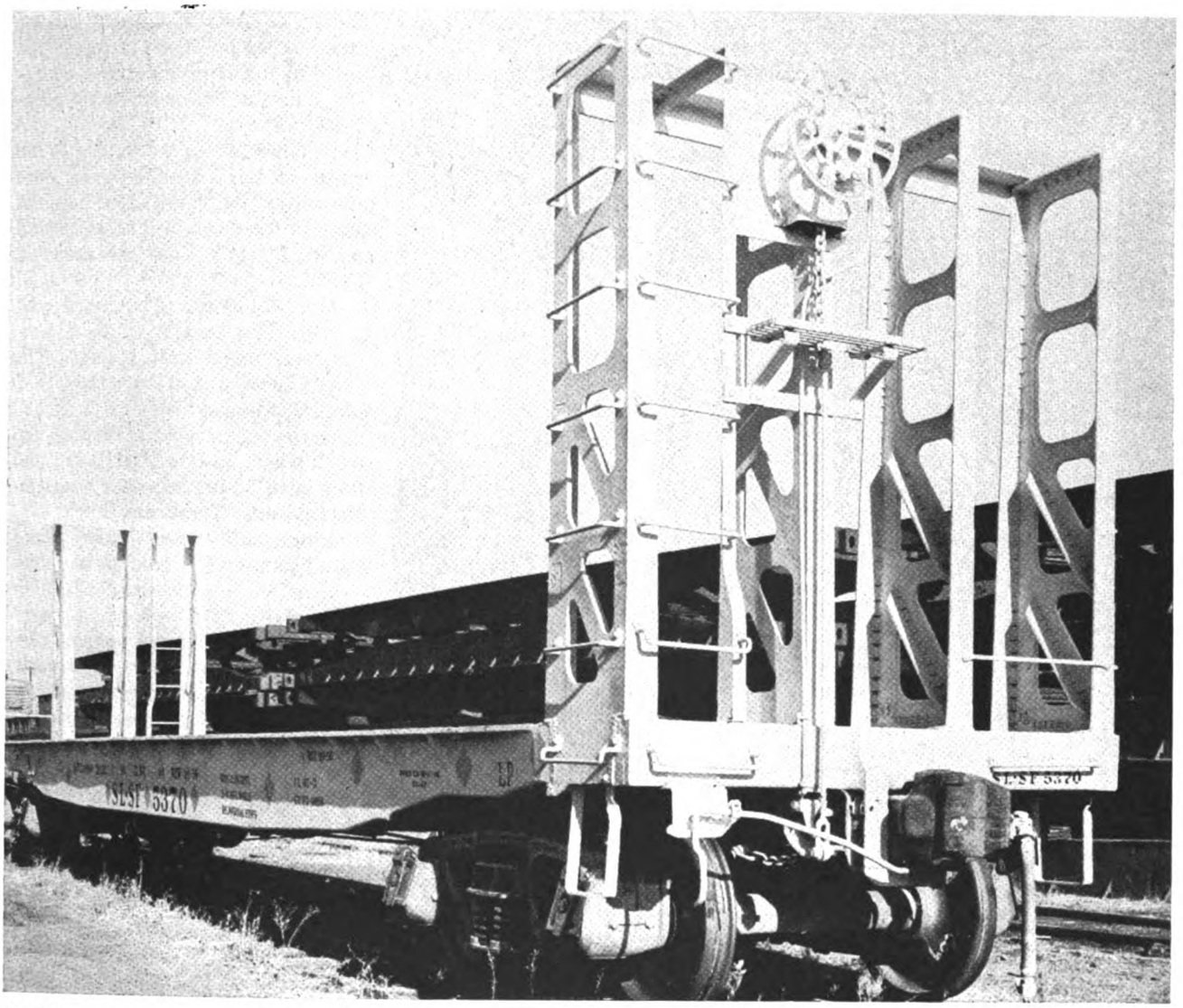
Roofed Gondola Handles Steel Shipments

Three removable roof sections and moveable bulkheads have been installed in a Pittsburgh & Lake Erie gondola car. One of the road's 52-ft 6-in. fixed-end cars with a wood floor was used.

Designed by the P&LE's mechanical department with the cooperation of steel shippers, this car was first intended to handle polished steel bars. Since going into service, it has been found to be very well adapted to handling tin plate and mill products; seems destined to be an important factor in the shipping of all types of steel and even other commodities. Roof sections are handled by overhead cranes which do the loading and unloading.







Underframe is one-piece cast steel in Frisco's new 70-ton pulpwood car.

Pulpwood Cars Have

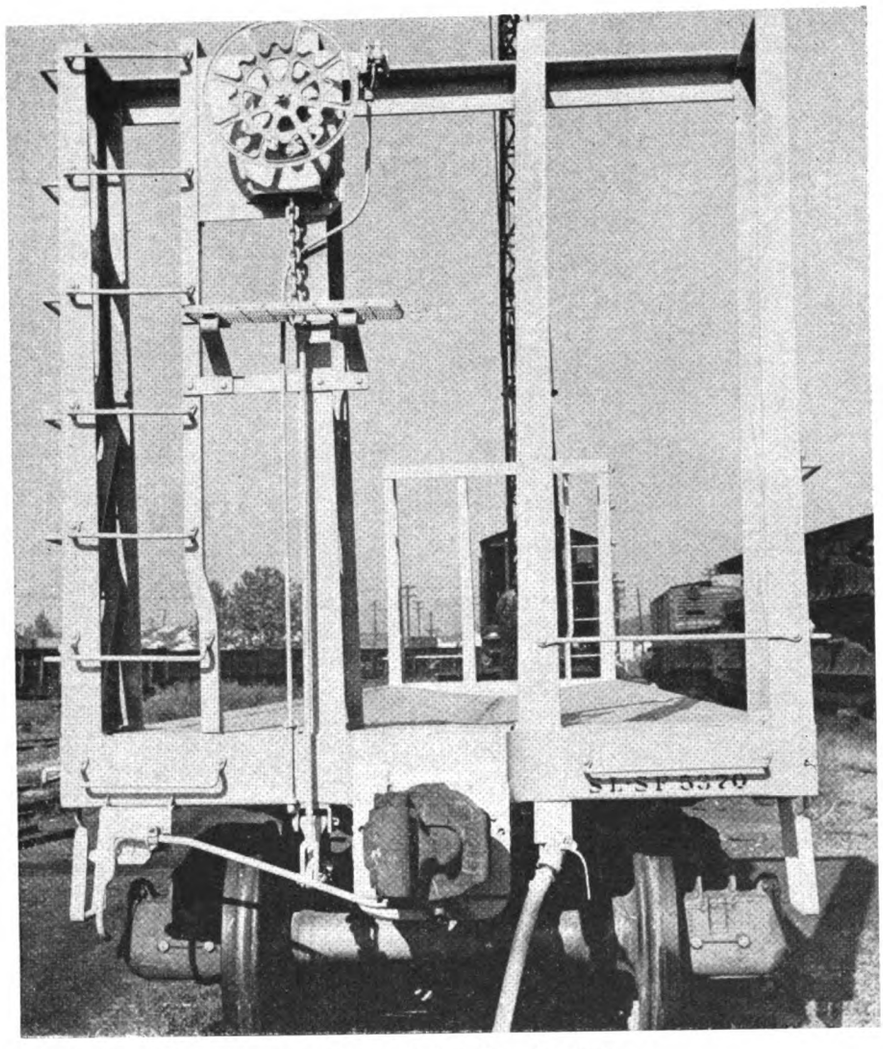
One-Piece Cast-Steel Underframes

Cars with 30-cord capacity are 20 per cent shorter, occupy less track, and help reduce switching costs

The Frisco is now assembling 150 of the new design 70-ton pulpwood cars with one-piece Commonwealth cast-steel underframes and interlocking upright bulkheads at the Yale, Tenn., car shops.

General Steel Castings Corporation developed this design after several railroads indicated an interest in a 70-ton car because of the present use of collecting points by the paper companies. The pulpwood logs are gathered from the field and moved to central storage yard for transfer to pulpwood cars. The basic principles of General Steel's original car, introduced in 1950, of which several thousand have been built, are incorporated in this new design. They provide for a corrosion-resistant, one-piece cast steel underframe, interlocking end posts, low side sill height for easy loading from trucks, and car floor sloped toward center of car. Automatic wedging action has been provided by making the distance between the upright end posts greater at the top than at the bottom.

Cored openings are placed in the top of the box-section center sill for drainage and exit of loose bark from the empty car to provide a clean



Open bulkhead allow clear vision. Sloping deck is for quick drainage.

Principal Dimensions of Frisco 70-ton Pulpwood Cars

Inside length, top, ft-in	45-6
Inside length, bottom, ft-in	45-0
Length over strikers, ft-in	50-3½
Length over truck centers, ft-in	39-3½
Width, ft-in	8-8
Height, end posts, ft-in	8-6
Height from rail to side of car, ft-in	4-0⅛
Capacity, lb	140,000
Capacity, based on 5-ft. logs	30 cords

floor. The ends of the car are left open for clear vision through the posts so machine and crane operators can see the position of pulpwood in the car.

The floor plates are welded to the center sill and side sill by continuous automatic welding. One hundred more of these cars will be assembled at the Frisco's Yale car shops in 1957.

The 70-ton car is equipped with Barber S-2A trucks, with 2½-in. standard travel coil springs. The trucks have 6 x 11 journals, R-S journal stops and Magnus broached bearings with depressed backs. The truck wheel base is 5 ft 10 in., and they have 33-in. one-wear wrought-steel wheels. There are Stucki side bearings, and Davis brake beams with Diamond "S" type brake shoes.

Cardwell-Westinghouse NY-11-F draft gear is used with type E couplers, Standard railway coupler centering device with height adjustment, and Y-40 vertical coupler yokes.

The cars utilize New York air brake, schedule AB-10 brake equipment, with brake cylinder release valve, type QRR. Also included is the Amweld slack adjuster and Ajax non-spin hand brake.

Frisco officials expect only normal maintenance on the trucks, draft gear, couplers and safety appliances, and no maintenance on the cast-steel underframe and end posts, other than wreck or fire damage. They do not believe rusting will be a major factor since, as the manufacturer points out from years of service experience, the underframe and posts are highly resistant to corrosion.

The Frisco is the first of four railroads ordering this new 70-ton design and a total of over 1,200 cars are on order at the present.

NADX "Mobile Reefer" Handles Perishable LCL

"Mobile Reefer", a refrigerated LCL system developed by North American Car co-operating with Geo. A. Hormel and Clark Equipment, has completed 90 days of successful service between Austin, Minn. and Chicago. Four dry-ice refrigerated containers are handled on and off the NADX flat with a fork lift truck. Latching and anchoring is automatic.

Car has wheel-driven generator for circulating fans and also standby receptacles. Reelites hold the connections for each container.

HOW TO

Learn About Air Brakes

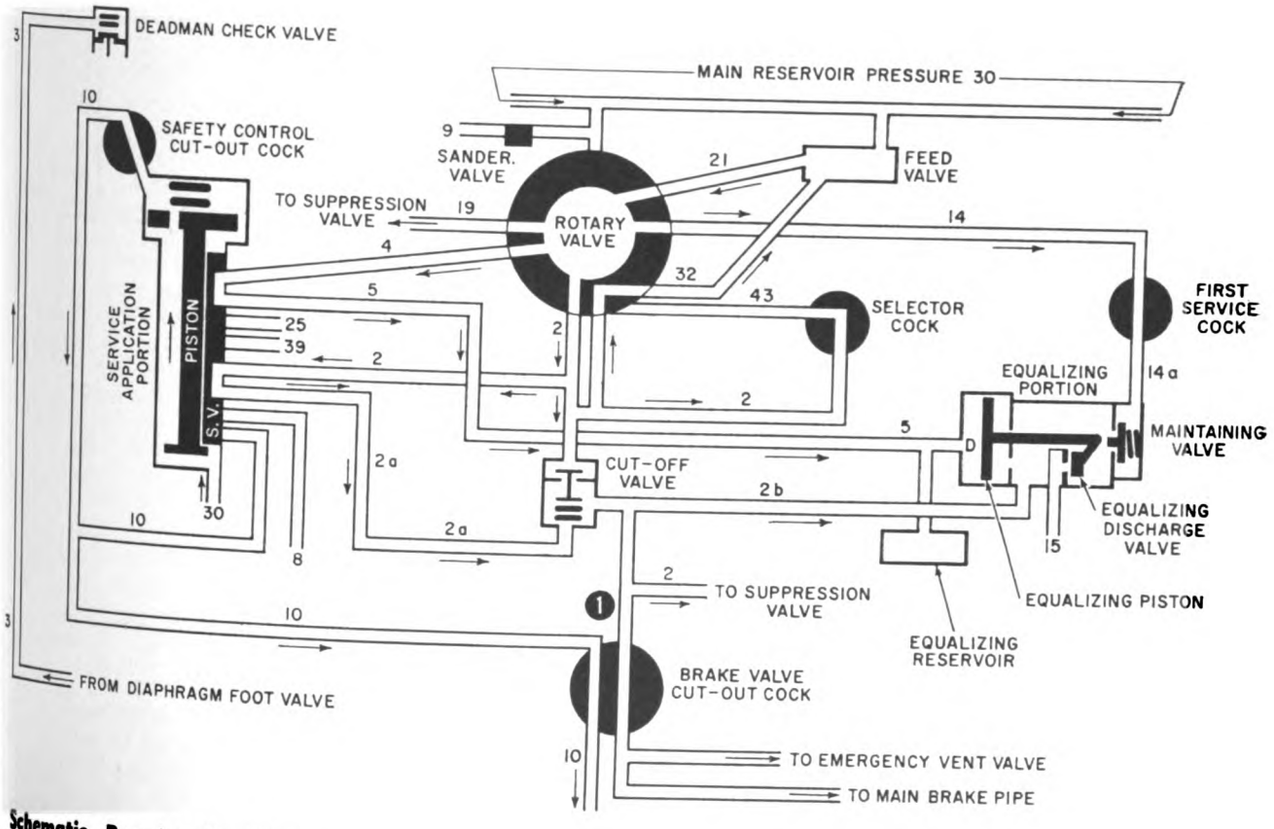
. . . AND HAVE FUN DOING IT

24-RL Automatic Brake Valves

Installment 1D

D-24-MC Pressure Maintaining Brake Valve

This is the fourth installment on the 24-RL Equipment in the Air Brake in Color Schematics series. For the 1C installment see page 71 of the September 1956 issue.



Schematic, *Running* Position

Main Reservoir Pressure (DS-24-H brake valve schematic in *Running* position). With a carmine pencil color passage *30* to the circle marked Rotary Valve, to the rectangular block marked Feed Valve, and to the sander valve. With carmine dashes continue in passage *9*, leading out of the sander valve, and start at connection *30* at the bottom of the service application portion, all around the piston and slide valve, including the long, narrow strip between the slide valve and piston. Color on through the port in the piston head and the chamber above the piston and into passage *10*.

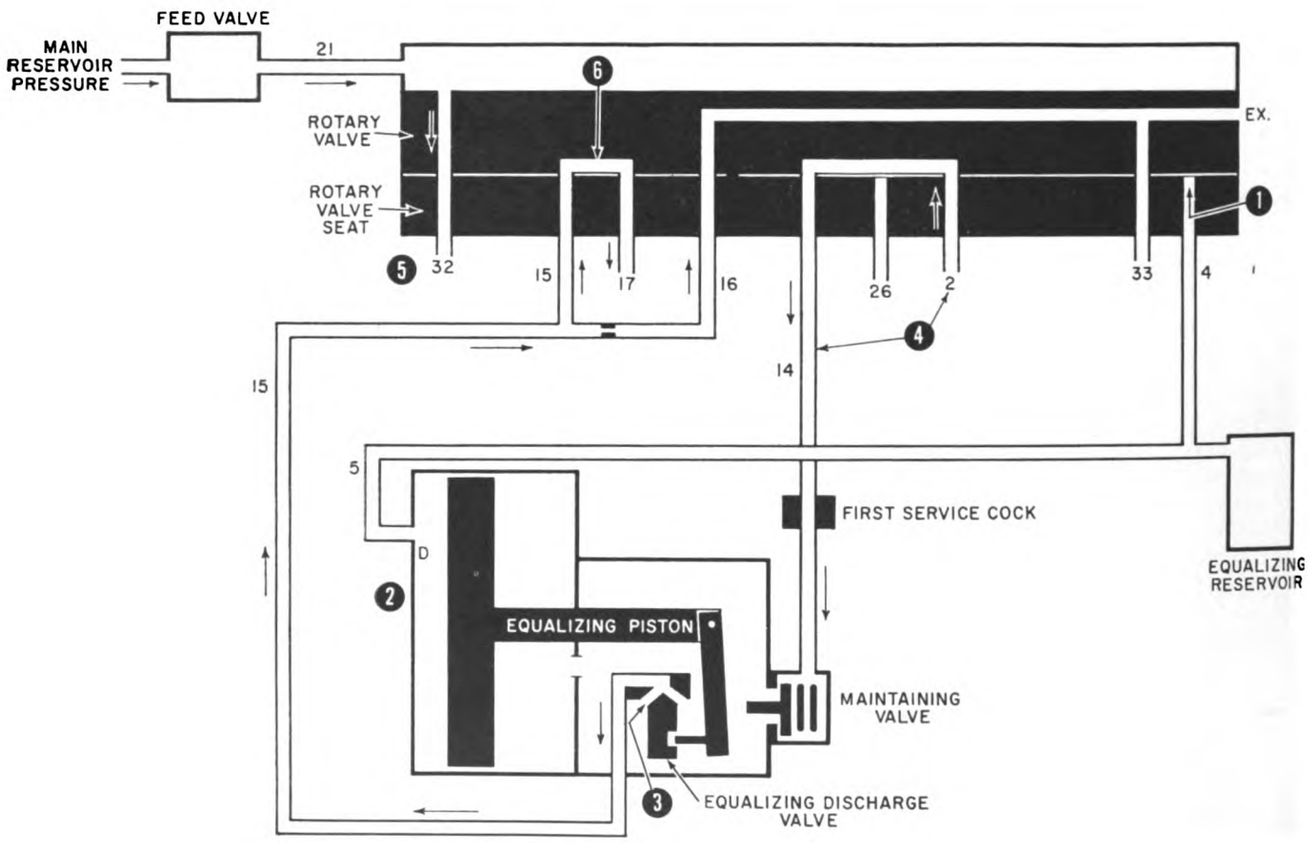
Carry carmine through the safety

control cut-out cock, down passage *10* through the brake valve cut-out valve (cock) to the safety control system not shown. Be sure to include the short branch from passage *10* to the slide valve (*SV*). Passage *3* is connected to pipe *10* by a cut-off valve in the Relayair valve unit (not shown). Show this passage in carmine and include the chamber above the deadman check valve.

Feed Valve Pressure. With the orange pencil fill passage *21* and include the inner circle marked Rotary Valve. Continue the orange into passage *19* which leads to the suppression valve and passage *14* through the first service cock, passage *14a* and the chamber to the right of the maintaining valve in the equalizing portion. Again with carmine, color connection *39* at the service application portion slide valve and in dashes color *25* and *8*.

Equalizing Reservoir Pressure. With light green and starting where passage *4* connects to the rotary valve, color passage *4* through the slide valve, passage *5* and the chamber at the left of the equalizing piston.

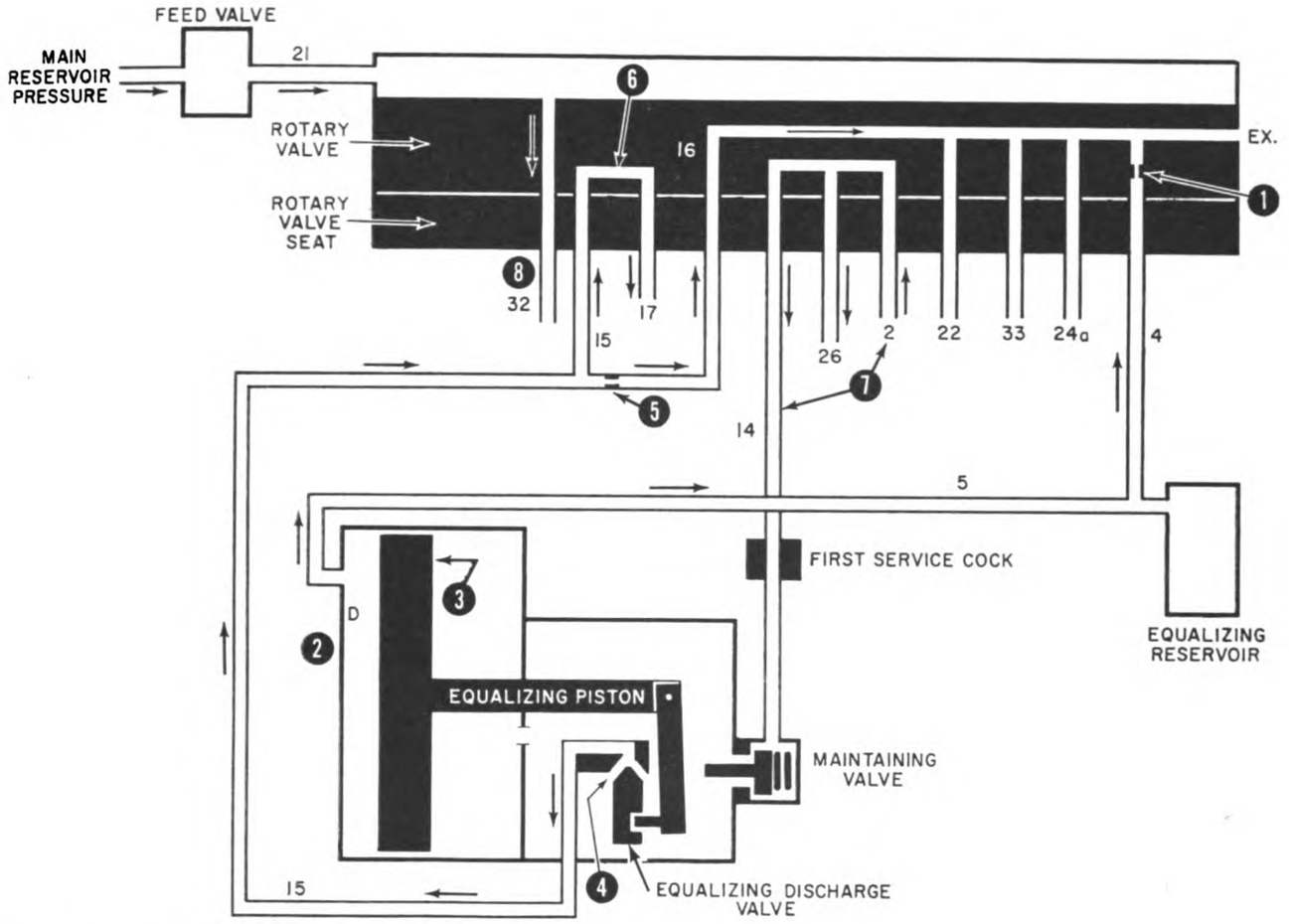
Brake Pipe Pressure. With yellow and starting at the point where passage *2* connects to the rotary valve, color passage *2* through the slide valve, passage *2a* through the cut-off valve, passage *2* to the selector cock and through the selector cock into passage *43* which is blanked at the rotary valve. Continue in yellow passage *32* to the feed valve, passage *2* from the right side of the cut-off valve, branch to the suppression valve, through the brake valve cut-out to the main brake pipe. Make certain you have included the branch emergency vent valve. Color passage *2b* to the right side of the equalizing piston and all of the space at the right of the piston. In yellow, color passage *15*.



Automatic Service, *Lap* Position

1. **The preliminary exhaust is blanked by the rotary valve.**
2. **There is no further reduction of equalizing reservoir pressure in chamber *D*.**
3. **The brake-pipe air continues to flow to *EX* by way of passages *15* and *16* until slightly less pressure exists on the brake-pipe side of the piston than that on the equalizing reservoir side.**
4. **This indicates brake-pipe air from passage *2* to passage *14* to the maintaining valve.**
5. **Feed-valve air in passage *32* flows to the feed-valve control chamber.**
6. **The exhaust passage *15* is connected to the suppression passage *17*.**

Automatic Service Lap Position. In carmine, color the short passage marked *MR* to the feed valve. With an orange pencil, follow passage *21* out of the feed valve, filling the space above the rotary valve and passage *32*. Again with yellow, color as you did in *Automatic Service* except for passage *26*, which is blanked at the rotary valve. Similarly, apply light green as you did in *Automatic Service*, except for passage *4* to *EX*, which also is blanked at the rotary valve.



Schematic, *Automatic Service* Position

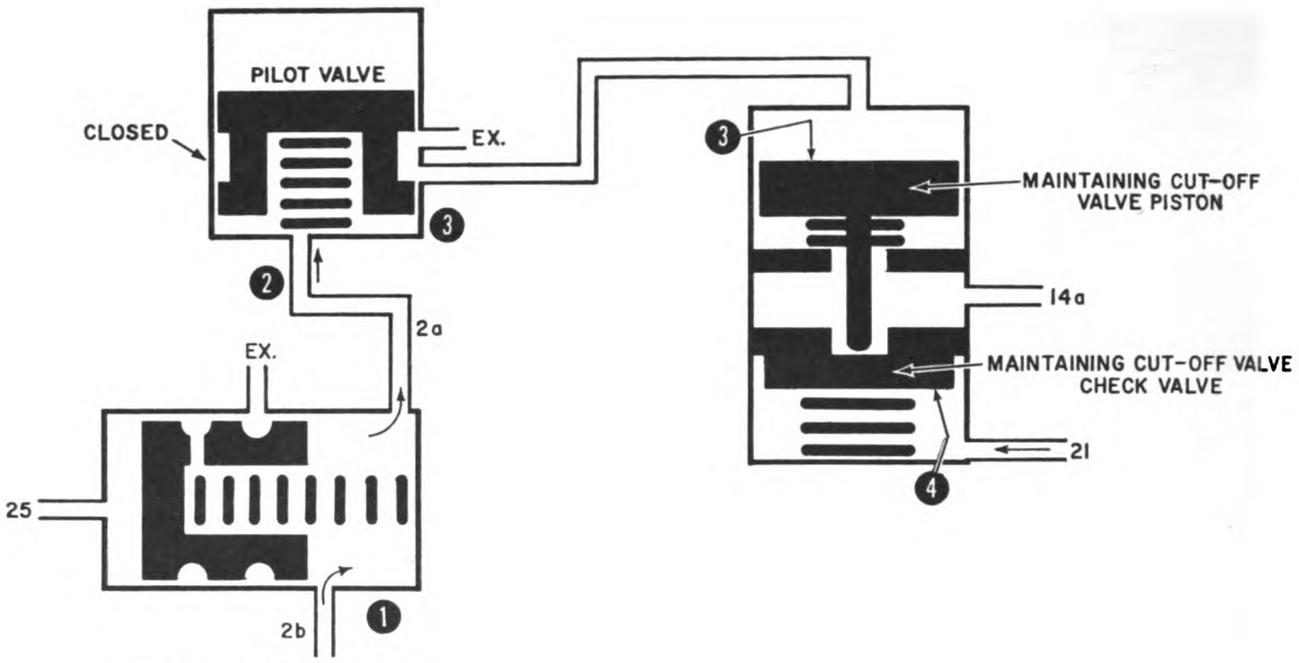
1. **Equalizing reservoir air passes through the preliminary exhaust choke to *EX*.**
2. **Air is reduced in chamber *D*, to the left of the equalizing piston.**
3. **The higher brake pipe pressure moves the piston to the left.**
4. **The equalizing discharge valve is unseated, connecting brake-pipe air to passage *15*.**
5. **This flow of air continues from passage *15* through the choke to passage *16* and then to *EX*.**
6. **This indicates passage *15* to passage *17*. *Suppression* results if it is used.**
7. **This indicates passage 2 to passage 26 (suppression), and on to passage *14* to the maintaining valve.**
8. **Feed-valve air in passage 32 passes to the feed-valve control chamber.**

Automatic Service Position. With a carmine pencil color the short passage (*MR*) to the feed valve. With the orange pencil color passage *21* out of the feed valve, the space over the rotary valve and passage *32*. Passage *32* at this time supplies feed valve air to the feed valve control chamber.

Now color in yellow the space at the right of the equalizing piston and through a passage to the section containing the equalizing discharge valve. Fill this section and into passage *15*, through the rotary valve seat, the cavity in the rotary valve, and stop where passage *17* contacts the rotary valve. Proceeding with yellow along passage *15*, go through a choke into passage *16*, extending the color to the exhaust passage. Place yellow dashes in the exhaust cavity to *EX*. Again in solid yellow, color passage *2* through the rotary valve and seat, passage *14*, the first service cock, and on to the maintaining valve. Show passages *17* and *26* in gray, starting at the junction of the rotary valve and seat.

In light green color proceed from chamber *D* at the left of the piston, through passage *5* including the equalizing reservoir, and passage *4* through a choke into the exhaust passage. Several light green dashes in the exhaust passage will serve to indicate flow of equalizing reservoir pressure to atmosphere. Do not confuse the encircled numbers with passage or pipe numbers.

For sketch on pressure maintaining



INTERLOCK CUT-OFF VALVE

A Partial Schematic, Pressure Maintaining Feature Cut Out

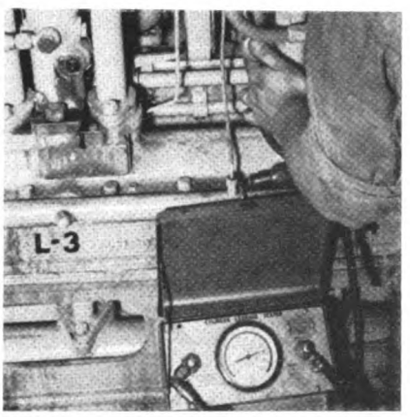
1. The brake-pipe air enters the interlock cut-off valve.
2. From here it proceeds through the interlock cut-off valve to the pilot valve spring chamber.
3. The pilot valve is in the *closed* position (down). This prevents communication to the maintaining cut-off valve piston chamber.
4. Feed-valve air from passage *21* enters the spring chamber against the closed maintaining valve check valve.

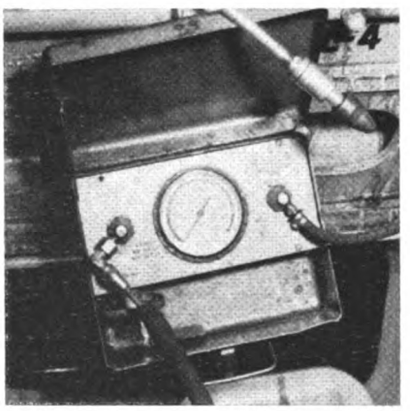
On the sketch showing a partial schematic of the D-24-MC brake valve, start with yellow at passage *2b*. Color this passage and the spring chamber at the right of the interlock cut-off valve. Follow passage *2a* and the space under the pilot valve. The pilot valve is shown in the *closed* position (down). Brake pipe air cannot flow to the passage leading to the chamber over the maintaining cut-off valve piston. Therefore, the piston remains in its upward position, permitting the maintaining cut-off check valve to close.

Continue with the yellow, coloring in dashes the chamber above the piston, the passage from the chamber through the cavity in the pilot valve to atmosphere at *EX*. Color in orange passage *21* and the chamber below the check valve. With a carmine pencil, follow in dashes passage *25* and the chamber at the left of the interlock cut-off valve. In each case, dampen the color with a brush and let dry before using another color. Do not color passage *14a* or the chamber over the check valve at this time, assuming that the first service cock is closed. Further schematics of this valve will be shown later.

Ideas for the Diesel Repair Man...

PISTON FAILURES REDUCED 90%. A reduction of 90 per cent of piston failures has been effected at the Marion, Ohio, shops of the Erie by the use of a simple instrument adopted from the automobile industry. It measures leakage past the rings in a diesel-engine cylinder and uses compressed air at any pressure from 70 to 200 psi. The instrument, known as a cylinder leakage tester and made by the Sun Electric Corporation, Chicago, measures the ratio of the incoming air pressure to pressure in the cylinder. This is a constant regardless of the applied pressure used. The gage reads 0 to 100. If no air leaks past the rings, the gage reads zero. If the rings offer no resistance to the flow of air, the reading is 100. Any reading below 70 per cent is considered satisfactory. In practice, pistons are tested once a month with the engine hot, just after shut down. Each piston is tested at the top of the power stroke with the valves closed. The port plug is removed and the rubber tip of the instrument's outlet nozzle is pressed tightly into the port plug hole. Shop air is connected to the lead-in hose of the instrument and the reading noted. If it is above 70 per cent, the piston is removed. The procedure has proved so effective that piston failures have dropped 90 per cent.





An actual test in progress. Since the reading was 77, the piston was removed and was found to have broken rings, tiny pieces of which had worked their way down into the crankcase without scoring the liner. Right: The instrument out of service with the port plug nozzle hanging down over the cover of the instrument housing.

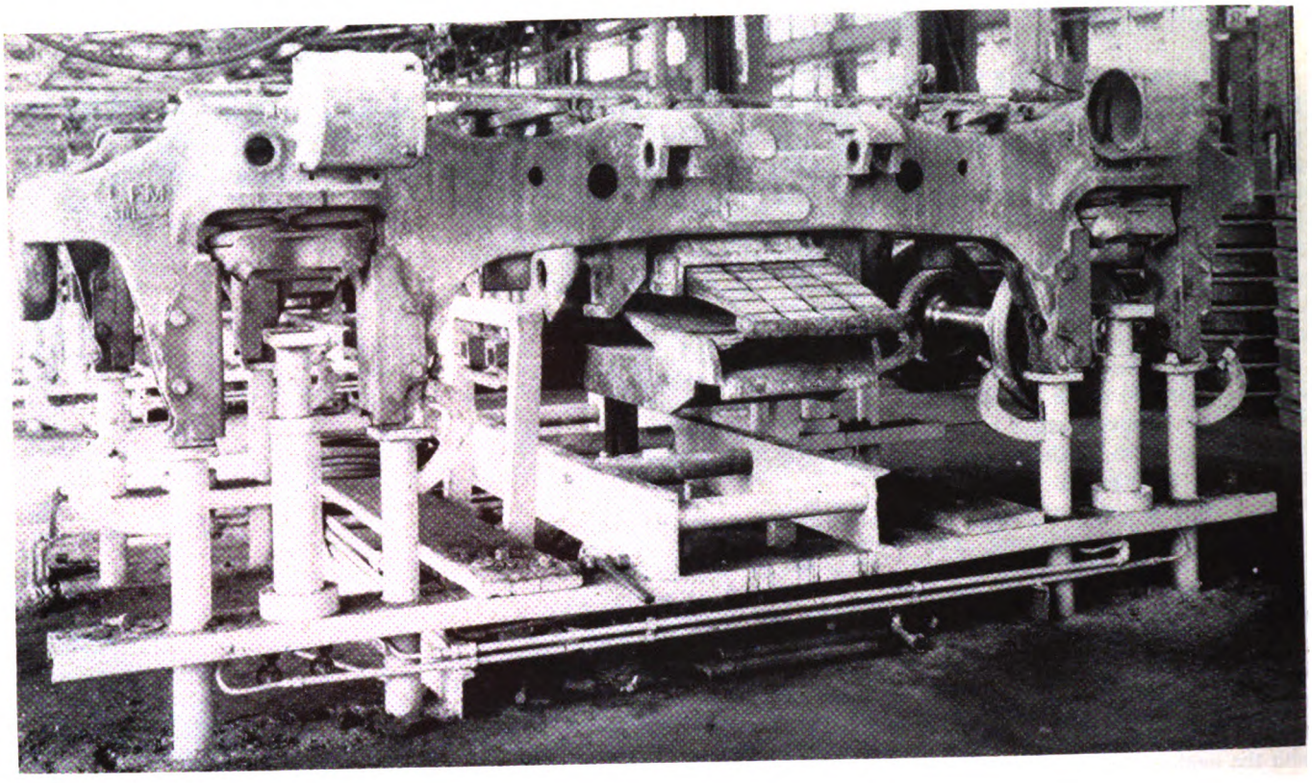
UP TESTS FOR LEAKY CYLINDER LINERS . . . . . and Finds Them.

The Union Pacific, has recently set up a system of testing certain types of diesel cylinder liners in its Omaha shops. This system, utilizing Zyglo fluorescent penetrant, with black light inspection, is said to offer substantial savings over previous methods of testing. Corrosion and pitting on the outside of liner, particularly in the top third, could show up later as water leaks into cylinder, after engine had been entirely rebuilt. This could result in piston seizure, due to lack of lubrication. A container was devised to allow the liner, which is closed at the bottom with a rubber gasketed cap, to be immersed in the penetrant. After a few minutes for penetration of the solution, the inside of the liner is inspected under black light. It is reported that of 32 liners tested the first day, 7 through-leaks were discovered, as well as smaller pits, even after the entire liner had been cadmium plated. In a 60 to 90 day period, 8 to 10 liners also have been found defective.

Leaky liners are detected by black light inspection.

These liners, according to the UP, almost certainly would have failed in actual operation, and a failure of this type, they assert, would require repairs of an estimated $18,000 to $20,000.

The UP states this new method of testing has taken the guesswork out of measurement of depth of corrosion, and to date, no liners going through this test successfully, have failed in actual service.



TRUCK REPAIR STAND. This device was developed at the Santa Fe shops, San Bernardino, Cal., to save time and labor as well as promote safety in repairing diesel locomotive trucks. It is one of three similar stands used both in dismantling and reassembling diesel power trucks. It consists of eight steel posts set in a rigid foundation and positioned to support a standard four-wheel truck on its pedestals. A stand with 12 posts supports the six-wheel trucks. Hinged clamps and hand screws can be quickly swung into place and tightened over the pedestal toes to hold the truck firmly down on the posts. Location of these posts in accordance with standard blueprint dimensions assures a square truck frame which is a good foundation on which to start rebuilding any truck.

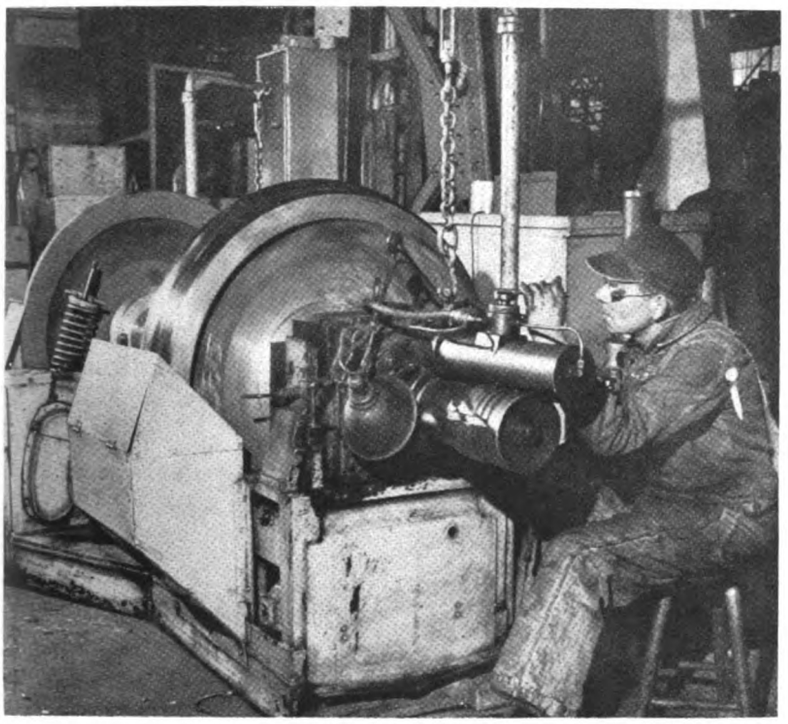
At the center of each pair of pedestals is a cylinder and hydraulic jack which can be used to press upward on the journal box coil springs to permit removal and replacement of pedestal wear plates. Another larger hydraulic cylinder set in the shop floor at the center of the truck stand is equipped with a piston which comes up under the center of the truck spring plank. Two tie-bars engage the truck frame over the lugs which support the traction motor suspension springs. The frame is held down while upward force on the spring plank releases pressure on the swing hanger pins, allowing them to be removed. A jib crane then holds the bolster up while the hydraulic piston is dropped. The piston carries the spring plank and elliptic springs down with it and deposits them on the four rollers which make it possible to roll these parts out from under the frame where they can be handled by an overhead crane. After this the jib crane drops the bolster on to these same ball-bearing rollers and it is also pulled out. A crane with a 700-lb hoist handles these parts.

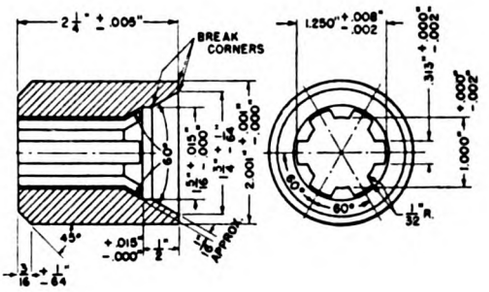
Hydraulic pressure for this diesel locomotive truck stand is supplied by an electric-driven gear-type pump made by the Oil Gear Company of Milwaukee, Wis. It is powered by a 12-hp motor running at 1,140 rpm and develops pressures up to 2,500 psi. A gage indicates the pressure. The development of excessive pressure is avoided by a safety by-pass valve in the equipment.

The practice is to remove the traction motors and truck wheels and then place the truck on this stand for disassembly. Foundation brake gear is removed along with the safety hangers and swing hangers. All parts are cleaned, inspected and Magnafluxed if necessary. Ex-Cell-O brake pins and bushings are checked and renewed if beyond shop wear limits. Bolster lateral wear is checked and wear plates are renewed if necessary.

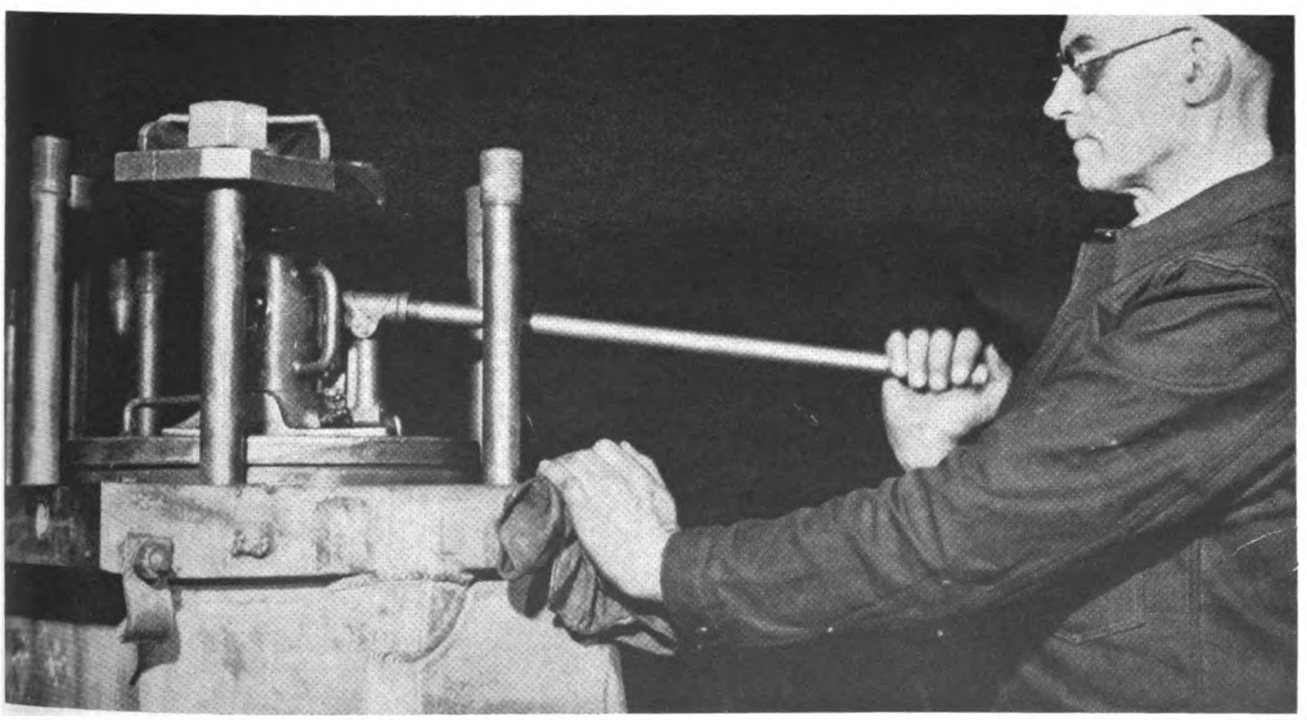
Truck parts and springs are reassembled in the reverse order. Wheels are placed on an adjacent track, the repaired truck frame is lowered over them, and the pedestal tie-bars are reapplied. The truck is then ready to go back into service. On the Santa Fe, diesel locomotive passenger trucks are overhauled after about 300,000 miles of service and freight trucks after 150,000 miles.

AXLES GET SPLINE FITTINGS . . .

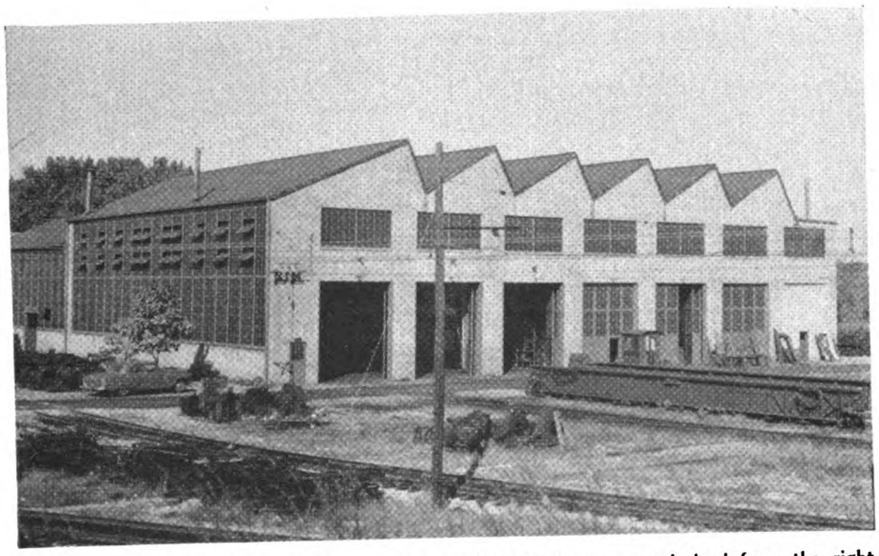




Axle end is bored for insertion (left) of the AAR standard spline fitting (above) on this machine at the Pennsy's Altoona shop. Use of this machine makes it unnecessary to remove wheels from axles—required when the work is done in a conventional lathe. Wheel set is rotated by an electrically driven rubber-tired wheel. Hydraulically-fed tools drill and bore to the exact dimension necessary for insertion of the fitting used to drive speed recorders and other control equipment.



Baldwin cylinder liner is forced into the engine A frame with this fixture incorporating a 25-ton hydraulic jack. Fixture is fastened over two of the head studs. It was developed at the Altoona Works of the Pennsylvania.

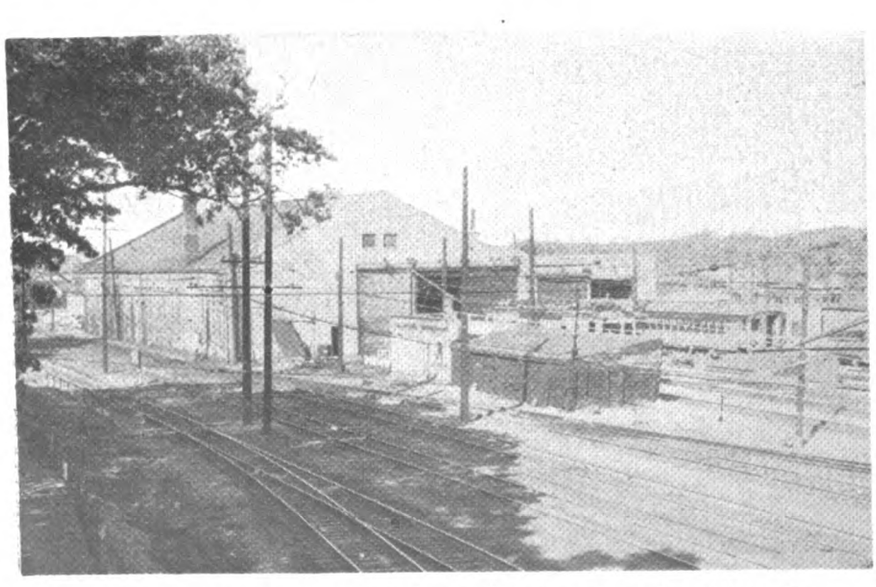


The heavy repair shop. Cars and locomotives are brought in on a track lead from the right to the transfer table on which they may be spotted for any of the six tracks in the erecting shop.

Chicago, South Shore and South Bend Shops afford many examples of what you can do if you put your mind to it

The Shop Behind the Railroad

CALLED "THE INTERURBAN that became a railroad", the Chicago, South Shore and South Bend remains a profitable enterprise under conditions which have eliminated more richly endowed contemporaries. This has been accomplished by good management aided by enthusiasm, energy and much ingenuity. The manner in which these qualities are translated into the everyday work of the mechanical and electrical departments gives tangible evidence of how the railroad has attained its success.



The inspection shop also houses the storehouse, air brake, paint and upholstery shops.

The railroad's policy of operation and maintenance takes cognizance of the facts that the life of electric rolling stock is inherently long, and the cost of maintenance low. This has been abetted by the purchase of locomotives discarded by other railroads and rebuilding or changing them to meet the needs of the South Shore.

The railroad has also equipped its shop by purchasing machine tools made available by other roads which have changed from steam to diesel motive power. The amount of work performed is not sufficient to justify the purchase of modern production machines. The prices paid for most of these tools were 50 per cent over scrap value.

The railroad has 77 miles of line and its rolling stock consists of 16 electric locomotives, 64 passenger

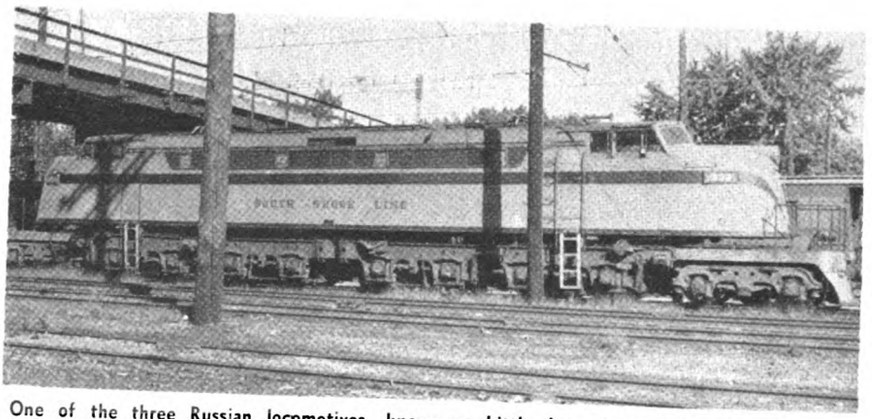
cars including 50 electric motor cars. It is electrified at 1,500 volts d-c and its cars operate over a 15-mile section of the Illinois Central suburban tracks which are also electrified at 1,500-volts d-c. Chicago, South Shore and South Bend revenues are divided almost equally between passenger and freight. The passenger operation produces practically no net income, but it is an essential part of the railroad's business.

The railroad's repair shop does all classes of mechanical work and includes a blacksmith shop and a carpenter shop. It also does all classes of electrical work, including the rewinding of not only traction motors, but all types of motors and generators used on the railroad. The shop problem is further complicated by the facts that the motive power includes three large electric locomotives built by General Electric for Russia, known as "Little Joes", four converted Type R2 New York Ceneral locomotives, four 100-ton former Illinois Central locomotives, five 85-ton electric locomotives purchased by the South Shore between 1926 and 1930, and one 600-hp diesel electric locomotive for industrial switching. Six more of the New York Central R2's have been purchased and are available for conversion. Their addition to the South Shore pool will displace the 85- and 100-ton units.

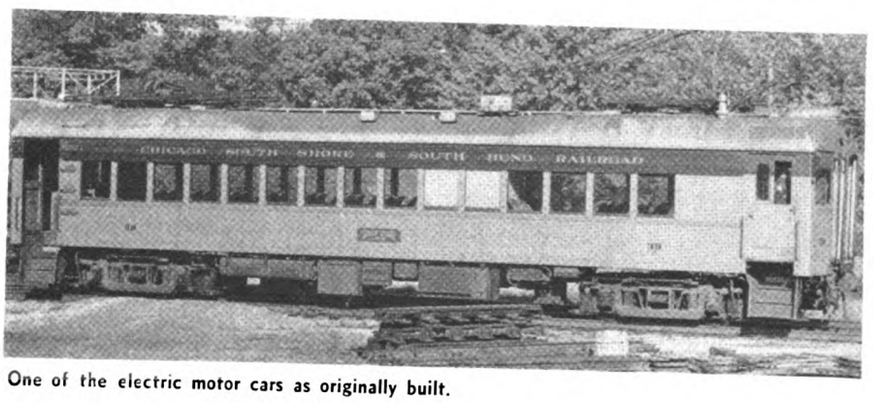
The Russian locomotives were designed for operation on 3,300-volt d-c power and the New York Central locomotives were designed for 600-volt d-c operation. Conversion, with considerable modification, seemed to be no problem for the shops.

The electric motor cars, as originally built were 60 ft long. To meet the demand of increasing passenger traffic, the cars were lengthened 17-ft 6″ by adding a section in the center and increasing the number of seats from 56 to 80. At the same time, the cars were modernized by the addition of long windows and the making of other improvements, 18 were air conditioned. The shops also maintain 14 cabooses, and 75 freight cars in interchange and service.

Motor cars and locomotives receive regular service inspections, and motor cars are overhauled at about 100,000 miles. Locomotives are overhauled according to service

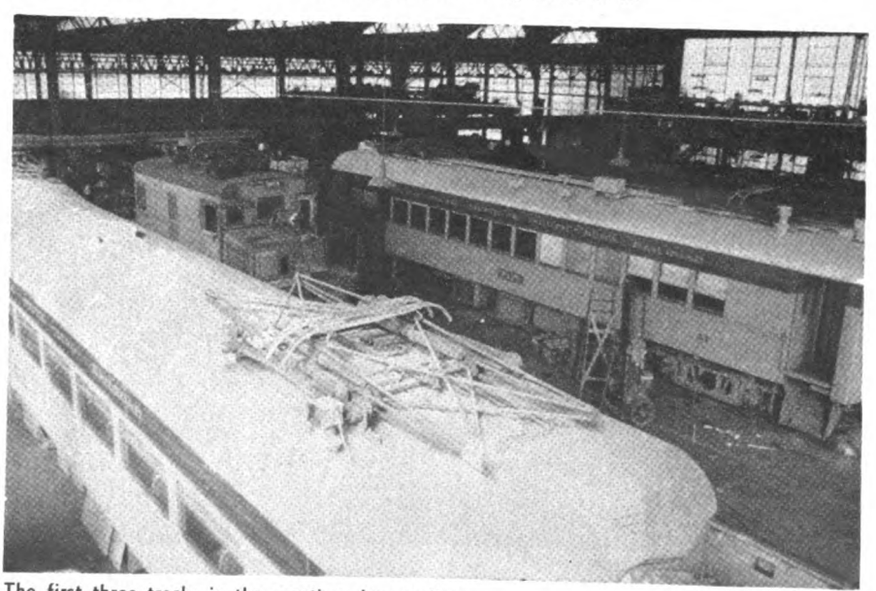


One of the three Russian locomotives, known as Little Joes, after being converted from 3,300- to 1,500-volt operation.

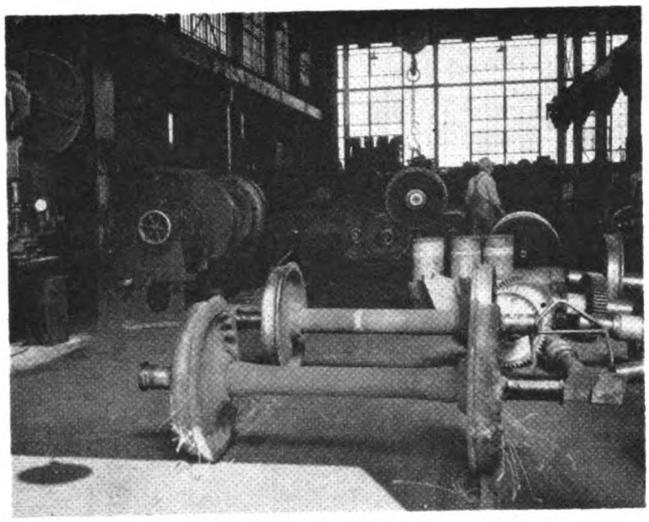


One of the electric motor cars as originally built.

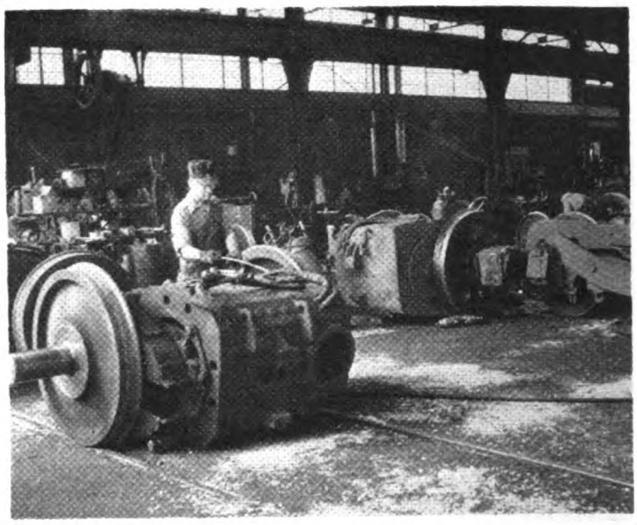
One of the motor cars after being modernized and lengthened 17 ft.



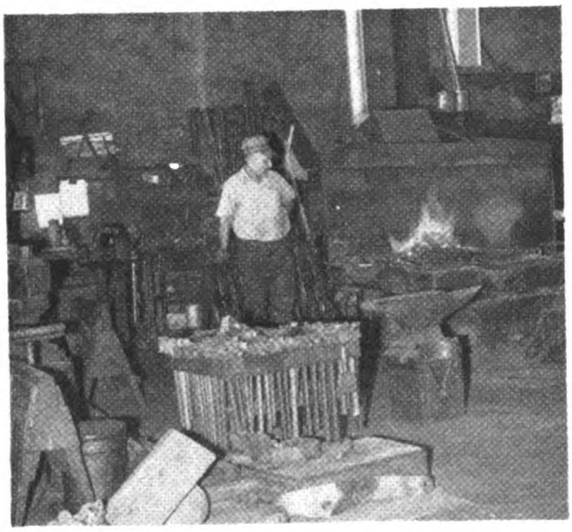
The first three tracks in the erecting shop section.



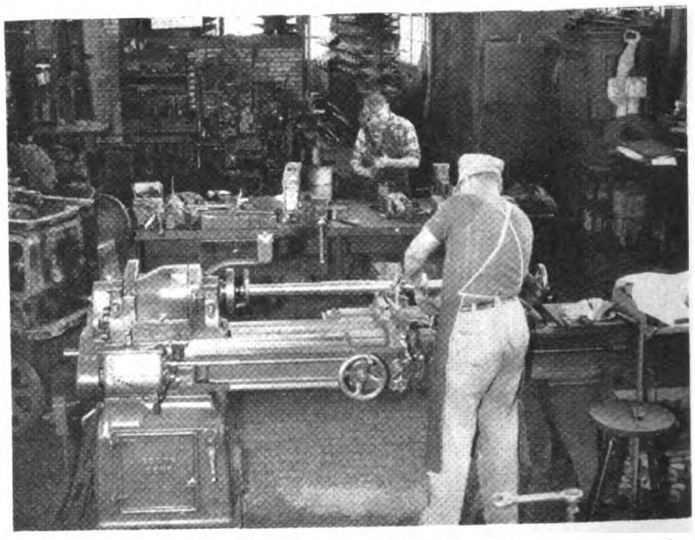
The wheel and axle shop. Tools provided for this work include wheel lathe, journal lathe, wheel press and car wheel borer.



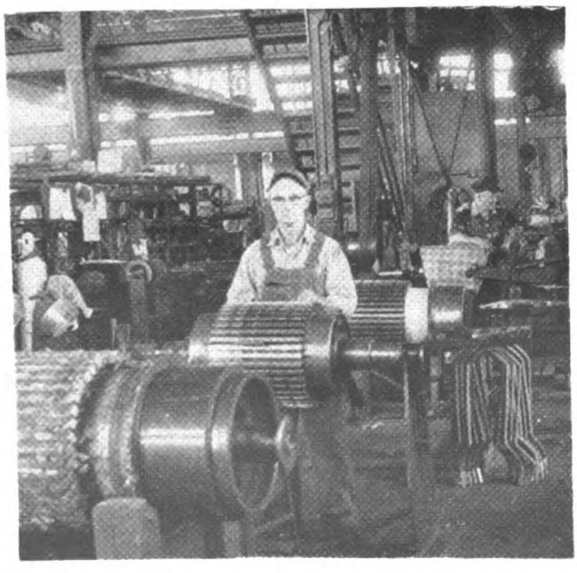
The truck shop. Work in this department is facilitated by power tools and a 10-ton crane.



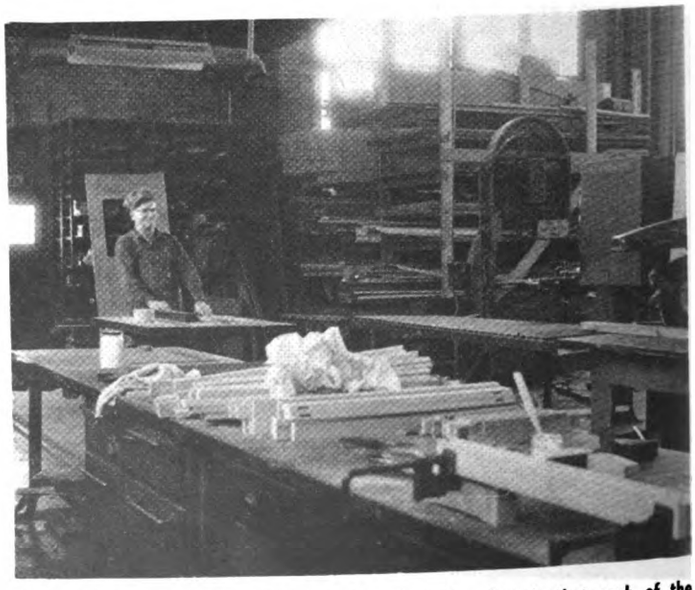
The blacksmith shop is equipped with Bradley helve hammer, hand forge, case hardening-pot, air press, welding booth and



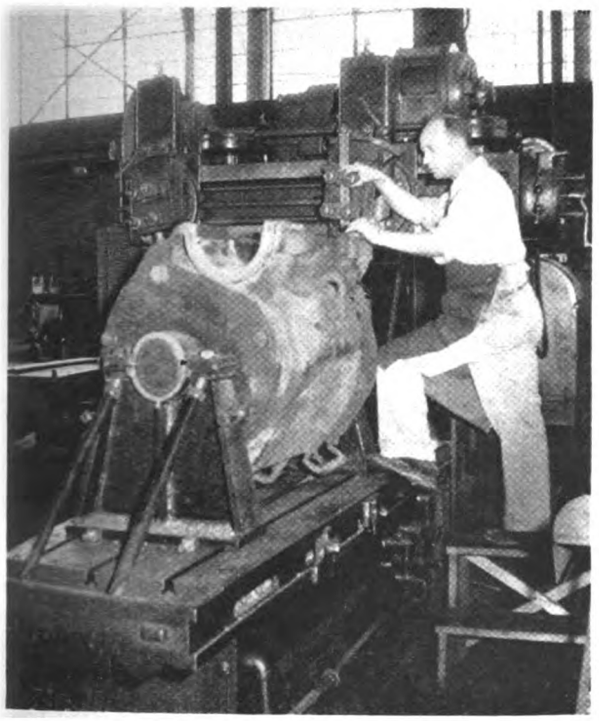
flame cutting machine. The machine shop section is equipped with lathes, boring mill, planer, turret lathe and miscellaneous small power tools.



There seems to be no limit to the variety of work done in the electric shop.

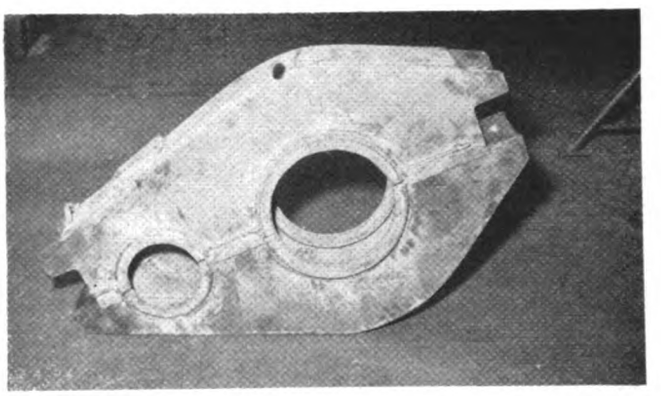


One of the important reasons for the carpenter shop is that each of the 50 electric motor cars has 12 doors.



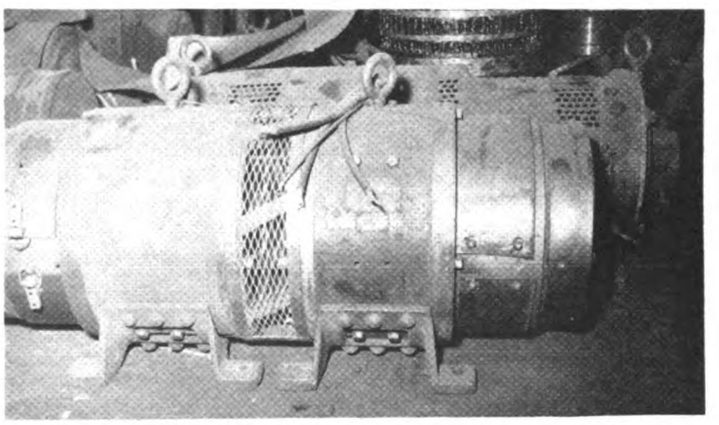
A shop-devised jig facilitates the planing of motor axle bearing fits.

Guided by the templet shown in the foreground, the Oxygraph cuts out the swing hangers which are stacked behind.

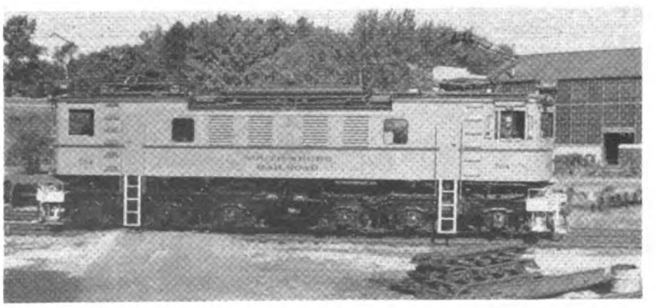


Complications of making a gear case are no handicap to the shop.

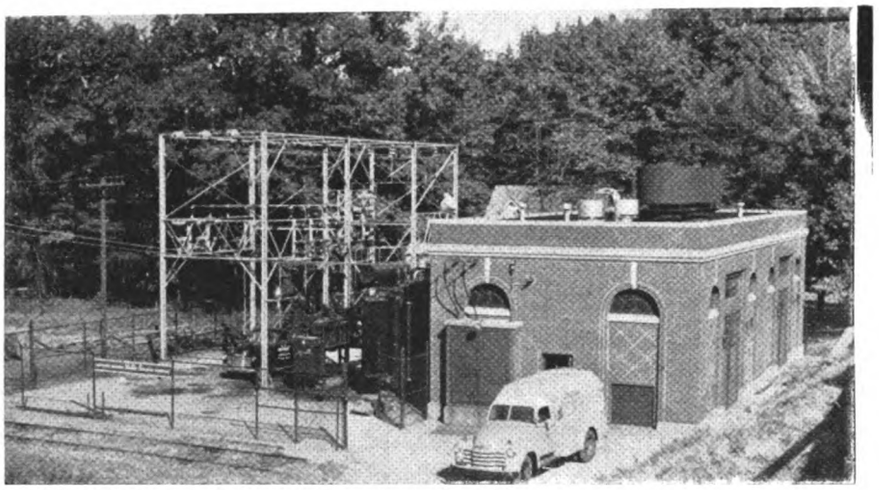
Test stand on which motor-generator sets for the motor cars are tested in their operating position. These sets are being rebuilt as shown in the following illustration.



A rebuilt motor-generator set. The rebuilding has done much to correct the commutation troubles inherent in a 1,500-volt commutator and eliminate excessive vibration.



A New York Central R2 locomotive, before and after, being converted from 600- to 1,500-volt service. Cab ends were raised to provide more room inside and to bring the pantographs to the proper height. Locomotives originally operated from third rail.



One of the sub-stations that supplies 1,500-volt d-c power for the overhead contact system.

The railroad was denied a needed extension to its shop during the war, and had to content itself with a balcony which is now used for small parts repair and is served by a dumb-waiter type of hoist.

The paint shop section of the paint and upholstery shop in the inspection building.

Electrical equipment is cleaned outside the shop with benzine and a cob blast. Restored electrical equipment is dipped and baked but not vacuum impregnated.

recorded by kw-hr meters on the locomotives, and the condition of the wheels. The average mileage between overhauls will vary from 40,000 to 50,000 miles.

Located at Michigan City, Ind., there are two principal shop buildings. One of these is the inspection shop which houses 3 inspection tracks, 200 ft long, the main storehouse, air brake testing rooms and a paint and upholstery shop and a carwasher.

The other structure houses the heavy repair shop and offices, shop stores and locker and toilet facilities. The latter facilities occupy a space of 100 ft by 165 ft and the repair shop is 200 ft long by 145 ft wide. One end of the building is occupied for the most part by an erecting shop with some space given to a carpenter shop over which is a balcony used for small parts maintenance. The remaining space in the shop is divided and equipped to provide a truck shop, wheel and axle shop, blacksmith shop, machine shop and electrical shop. In addition to heavy repairs, the shop also makes all changes in equipment roster by modifying present equipment. Welding is used considerably in maintenance work, and in adapting locomotives purchased from other roads to South Shore requirements.

How Much Do You Know About Brushes

This is the first of a series of questions and answers on carbon brushes which will appear each month.

Why Is Carbon Used as the Basic Material for Commutation?

THERE IS NO NEED that an atmosphere of mystery should surround the basic information pertaining to the performance of carbon brushes. It is unnecessary that railroad personnel become brush experts. This would require a long period of direct association with the production, treatment, and testing of brushes. It is possible, however, to quickly acquire an understanding which will result in savings in time, money, and delays for the railroads. In introducing this series of questions and answers, it is the author's hope that they will be of benefit to the railroad operating men, particularly the electrical group.

A brush must have certain basic properties if it is to perform its work satisfactorily. These properties may be divided into two groups. The first group consists of physical properties. The second group are the electrical properties. The sequence of arrangement has no bearing on the relative importance of a given property.

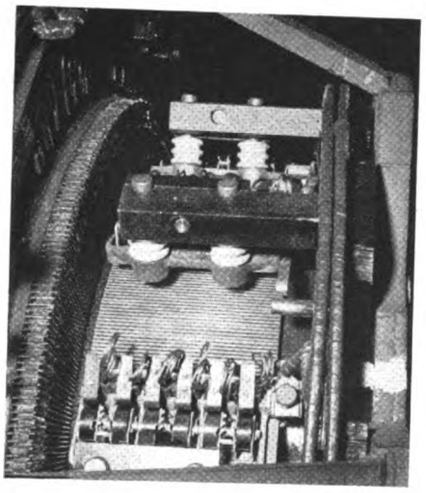
Physical Properties

Brushes must have the following physical properties:

STRENGTH, sufficient to withstand the stress or mechanical shock to which a brush is subjected in service to permit the attachment of hardware or connections, and they must be non-abrasive, in the sense that the brush does not wear the commutator.

MACHINABILITY, to the extent that grinding, drilling, and sawing operations do not cause chipping or stresses which later result in breakage.

LIFE, of a level sufficient to give the user maximum service at minimum cost. This property is inseparable from the electrical property of commutation in that the utility of a brush must be judged on its performance as to life and commutation. This is discussed further under commutation.



RESISTANCE TO OXIDATION OR BURNING. Some materials, including some forms of carbon, oxidize more rapidly than others at low temperatures.

INERTNESS, in the sense that the brush must not react chemically with the commutator or brushholder under normal conditions.

FREEDOM FROM HARMFUL BY-PRODUCTS DURING USE. The spent material of the brush must not cause corrosive actions. It must be easily removed from the atmosphere about the commutator.

CONTROLLED RESILIENCE, as it affects the riding properties of a brush. The brush must also be non-brittle, in the sense that failure from mechanical fatigue does not occur.

LOW FRICTION, to enable the brush to ride without skipping and without destroying the commutator film layed down in commutation.

Electrical Properties

Brushes must also have the following electrical properties:

CONDUCTIVITY, of sufficient level to satisfactorily conduct the highest amperage encountered in service.

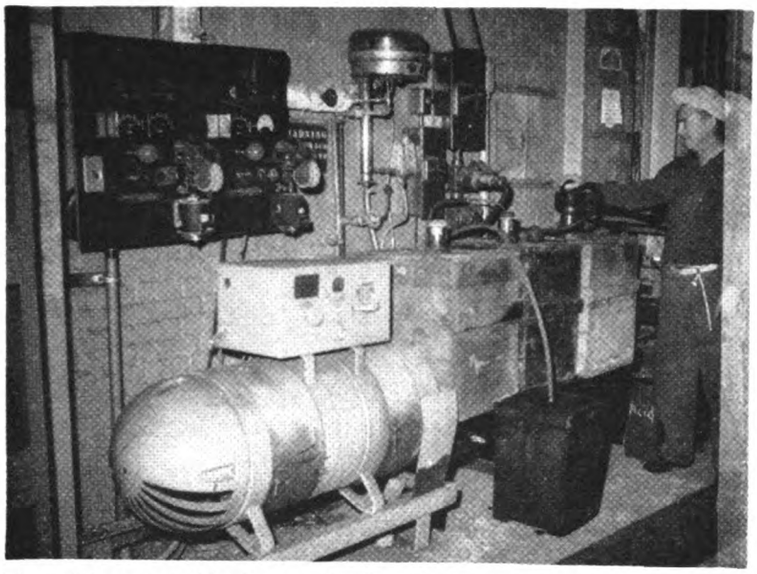
LOW CONTACT RESISTANCE, in line with the design properties of the machine if excessive heat levels are to be avoided in the commutator, and burning of commutator bars is to be prevented.

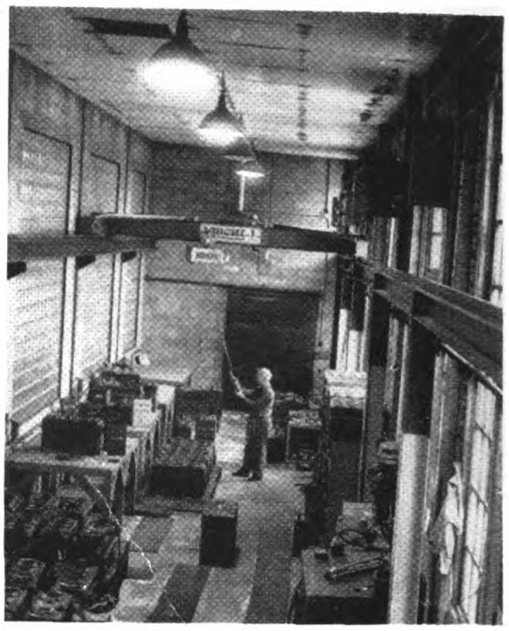
FILMING PROPERTIES, such that, regardless of the current level passing through the brush or the rubbing speed of the commutator, a protective film remains on the commutator to prevent the brush from abrading the bars.

COMMUTATION—The brush must be capable of carrying the short-circuit currents, inherent in the armature coils, as their related bars pass under the brush. This must be accomplished without burning of the bars. It then follows that the brush must have sufficient range of commutating ability to handle any given voltage—current—speed relationship to which the machine may be subjected. In addition to this difficult assignment the brush must have a useful life. Longest life cannot be obtained unless the brush commutates satisfactorily. Excessive sparking and burned bars act to erode and rapidly wear away the brush. But it is only temporary economy to judge a brush solely on long life. Brushes can be produced from carbon which will wear extremely well and give fair commutation. The dream ends when the commutator shows ridging after the third or fourth set of brushes.

After consideration is given to all of the preceding properties as being required in one material, it becomes apparent that no other known basic material but carbon could be selected for brushes. The scientific methods on which the production of successful brushes is based today have developed carbon brushes far superior to the pieces of retort coke used by Mr. Van Depoele on his first electric car motors. However, the element carbon still has no superior as the best basic material for commutation.

BY K. R. MATZ
National Carbon Company





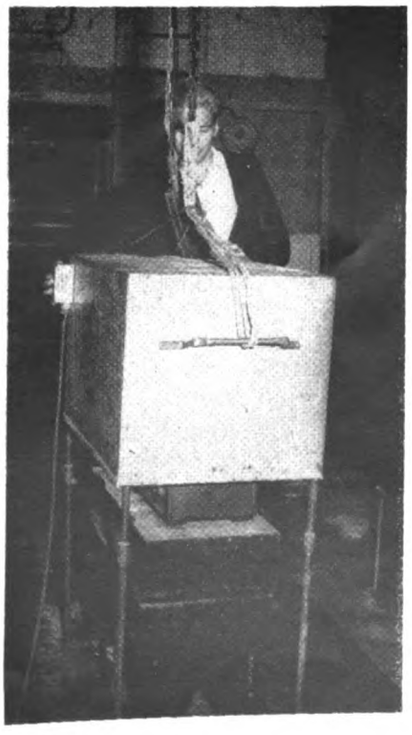
The welding set used for battery charging and its control panel. Also shown is the water still and carboys for electrolyte. At right: the battery repair shop.

For Long Battery Life . . . . .

Erie gets its money's worth from diesel batteries by means of cleanliness and careful attention to regulator setting

◀ Heating cover for softening battery cover sealing compound.

Charging voltage is checked daily with a portable voltmeter. ▶



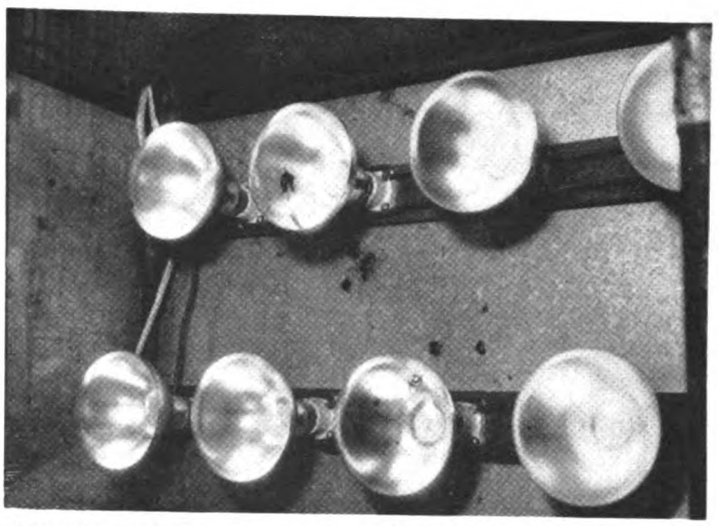
CAREFUL AND FREQUENT charging regulator adjustment and meticulous cleanliness as practiced in the Hornell Shops of the Erie, backed by a good battery shop, are paying off in good battery performance and long life. An eight-year life of battery elements is common, and additional service is another benefit obtained by battery shop care and rebuilding.

Charging generator regulators on the locomotives are checked daily. EMD regulators are set to idle at 74 volts and the throttle is then advanced to one-half or more and the voltage checked for regulation. It should not exceed 74 volts nor vary more than one volt for any steady state condition. Greater variation indicates improper regulation due to defective commutation.

Portable meters for the voltage test are made by fitting switch-board voltmeters into a plywood case. The meter panel in the case is placed diagonally between the top back and bottom front of the case to leave room inside for leads when the box is closed.

Batteries and the inside of battery boxes are washed once a month. They are first cleaned with a solution of baking soda, applied with a brush, scrubbing until all foaming stops, after which they are rinsed

A gas-fired plate is used to melt cover sealing compound. It is poured into the sealing space through snout of the coffee pot.



Eight infra-red lamps are mounted on the underside of the top panel of the heating cover.

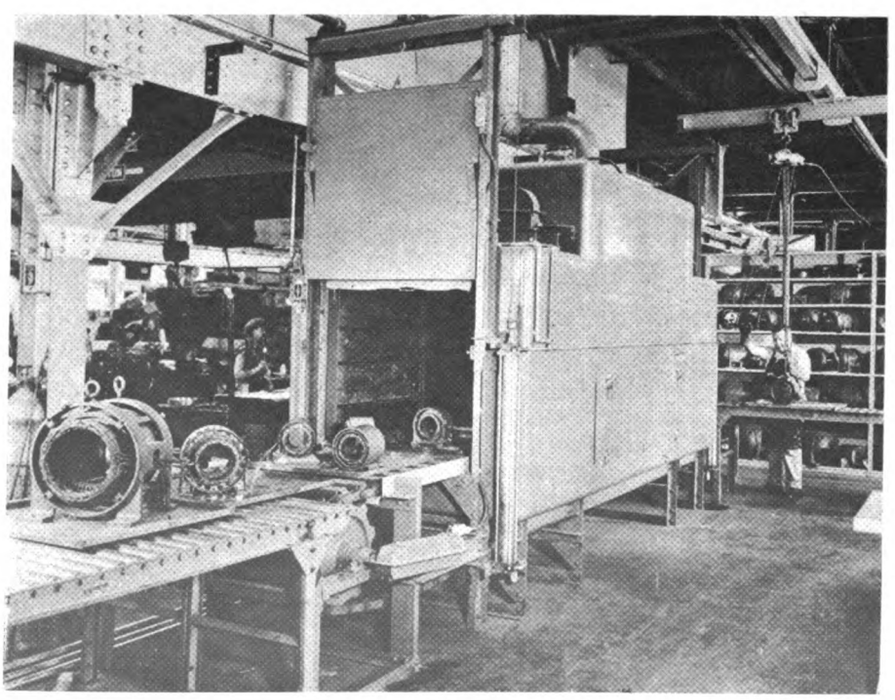
After the battery is scrubbed with soda solution, it is washed with clean water and dried with compressed air.

with clean water and dried with compressed air. Electrolyte level is checked every 2,000 miles and adjusted if necessary.

Batteries are removed from locomotives at 3-year intervals and taken into the battery shop. Here they are checked for capacity by charging and discharging at the eight-hour rate. They are kept in service without replacing elements if the capacity exceeds 75 per cent. Elements are replaced or cases renewed as necessary.

Batteries serviced at Hornell, N. Y., include those on 238 locomotives in operation from Buffalo, N. Y., east. The work is done in a newly-built battery shop which is 15 ft wide by 60 ft long. Equipment in the shop includes a 200-amp welding machine for charging batteries, a shop-built discharge panel, one gas hot-plate for melting cover seal compound, an infra red heating cover for softening cover sealing compound in batteries, a steam-heated water still, a washing stand, a five-ton crane, work stands 18 in. high and 36 in. long, lead burning equipment, strap cutters, hand tools for removing cover compound, tray lifters and element pullers and a large vise.

MOTOR REPAIR PRODUCTION LINE. A semi-automated production line has cut repair time of electric motors over 50 per cent at the General Electric Company's Chicago Apparatus Service Shop. Motors up through 50 hp. can now be diagnosed, dissembled, cleaned, rewired, rebuilt, tested, and ready for delivery in 8 hours. This faster time compares with about 19 hours normally required for complete motor service. Representing the first time a motor repair production line has used a completely automatic baking oven, the integrated system has conveyor lines throughout.



Mis-Placed Fuse Causes Diesel Failure

By Gordon Taylor

MOST DIESEL FAILURES caused by fuses involve a "blown" or failed fuse, but this tells the story of a failure caused by a good fuse. In this case, the fuse was perfectly okay. It had, with the help of some careless individual, been permitted or caused to wander away from home to a location where it caused the failure of a diesel unit.

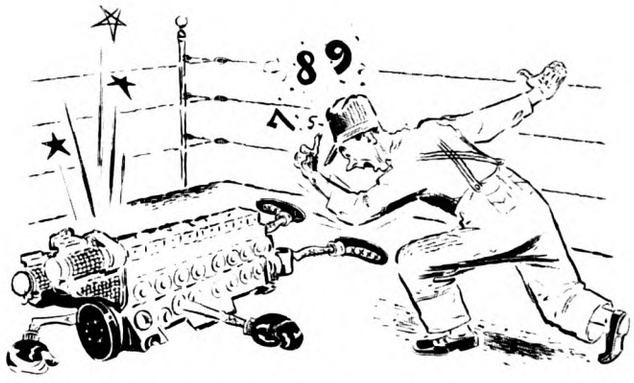
A four-unit freight diesel was dispatched from a principal terminal with all units apparently okay. Before the caboose cleared the yard, trouble appeared in the form of ground relay action.

The crew applied the usual first aid treatment of restoring the ground relay. As soon as the engine was put back on the line, another ground relay action occurred. Just as in a boxing match, when the ground relay went down for the count of three, the fireman had to count the engine out until the cause of the trouble could be found.

The locomotive, operating in level territory, managed to reach a small intermediate terminal about 30 miles late, without reducing tonnage. However, at this terminal, the train would start over a territory of heavy grades, and tonnage would have to be reduced unless the cause of ground relay action could be located and corrected.

The foreman at the small terminal was equal to the occasion. He quickly noted that the condition of the main generator commutator and brushes seemed okay. He then started looking for places where something might be grounding a power circuit.

He found that a spare 80 amp. control fuse had fallen out of its usual storage rack and landed in the bottom of the cabinet near the floor. The fuse was contacting a large power cable at one end of the fuse, with the other end against the steel cabinet frame. The result was continuous ground relay action.



The fireman had to count the engine out!

Placing the fuse back in the spare fuse storage rack cleared up the trouble, and the diesel was back in business.

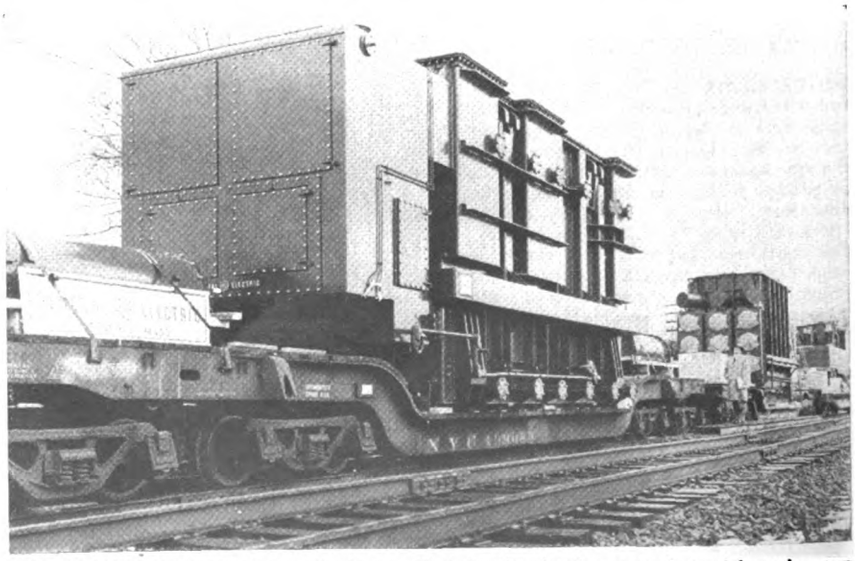
This case emphasizes the need of care in handling and storing spare fuses. The fuse had to have some help in getting to a place where it could cause trouble.

If you drop a fuse in one of these cabinets, be certain to find it, and restore it to its proper place, either in the fuse clips or on its storage rack.

See that fuses placed on spare storage rack are properly placed in spare fuse holders, and do not slam the cabinet door on which spare fuse holders are mounted. Such rough handling may dislodge fuses and cause a failure similar to the one described here.

Remember, if you want to take the "Die" out of diesel, you must put more "Care" into careful maintenance.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



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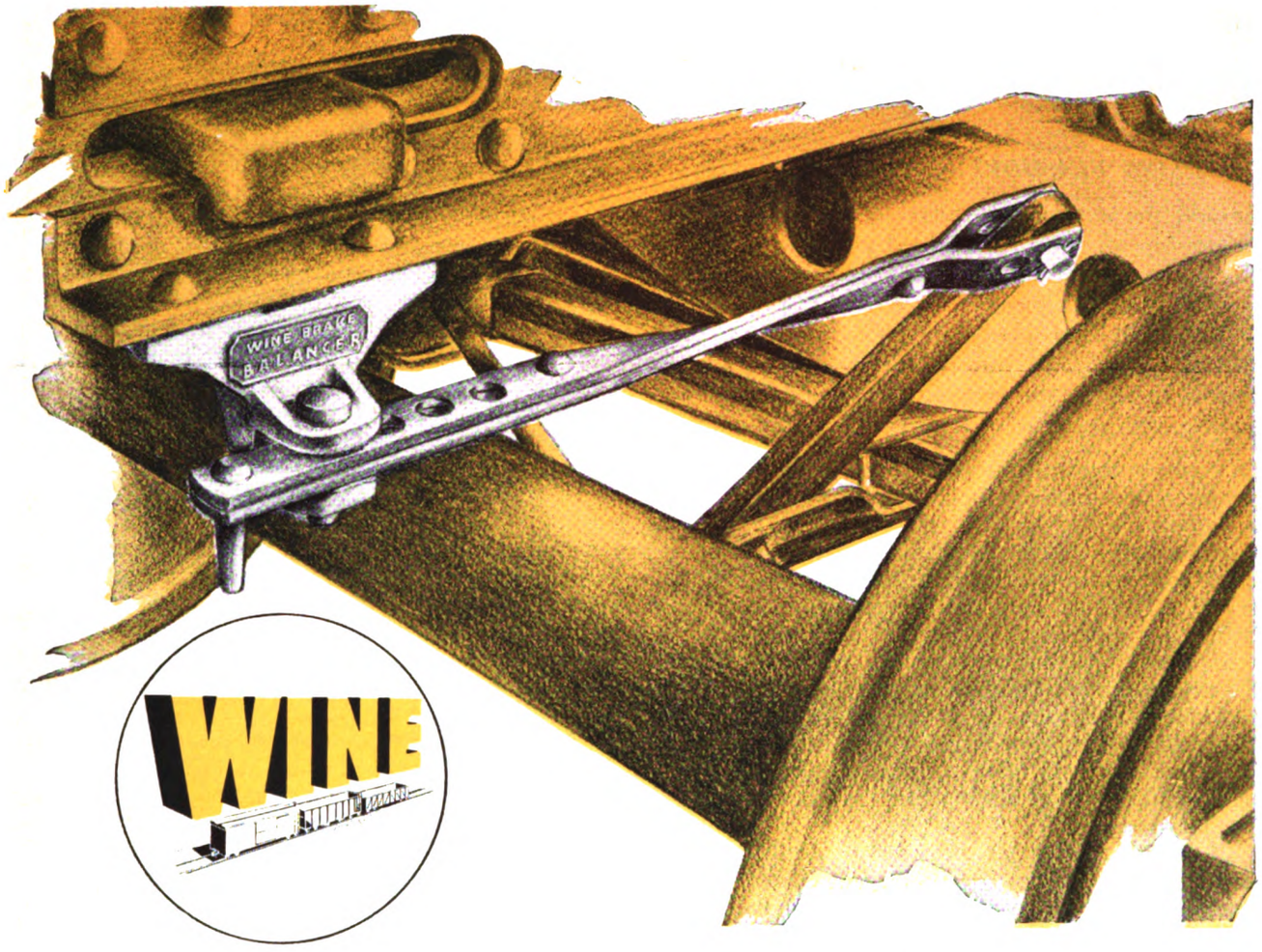
EQUALIZE BRAKE FORCES..



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The Wine Brake Balancer replaces the standard dead lever connector and eliminates the necessity of the dead lever connector bracket on the truck bolster

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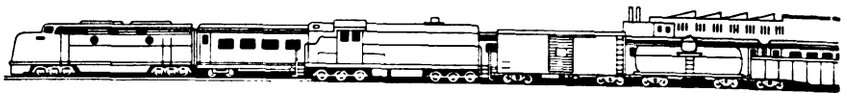
PROBLEM PAGE . . .



WHERE THE TOUGH ONES ARE HANDLED

HANDLING FLASHOVERS

Should the extent of a traction motor flashover determine whether it is cleaned up in place under the locomotive, or should the motor always be removed? If the practice of cleaning in place is followed, what is looked for to determine if this will be done, and how can the locomotive be moved to rotate the armature and permit inspection and cleaning of the entire commutator?

OUT FOR STRING BAND DAMAGE, *by R. M. Spencer.* To say that a traction motor should always be removed after a flashover is too broad a statement to make. Some flashovers are so slight that the only evidence is some bright spots on the brush shunts. If the flashover isn't too severe, it may go until the next monthly inspection, before it is discovered.

If the wire band has been touched, remove the motor. To remove a truck and then remove the traction motor from the truck requires about three or four hours. Then the work on this motor would require additional time. Therefore, you could afford to spend three or four hours cleaning the traction motor under the locomotive, and be time ahead.

If the wire band were cut or burned or damaged in any way, then the motor should be removed, and it should come out if the commutator or the insulation has been damaged beyond quick repair. However, if upon examination, the damage appeared to be such that it could be repaired under the locomotive in a reasonable time, then I would try it.

If any work had to be done which required turning the armature, such as stoning the commutator, or cleaning the string band, then the axle should be jacked up. Welding machine leads should be attached to that particular circuit in the control cabinet in order to turn the motor.

If the cleaning of the armature required only slight infrequent moves then the axle would not have to be jacked up but the locomotive could be moved in order to move the armature.

WORK THEM IN PLACE, *by C. W. Martin, assistant engineer—diesel electric, Baltimore & Ohio, Baltimore.* Any maintenance shop which will remove a traction motor merely because it has flashed over must have plenty of labor and plenty of locomotives that they can hold out of service, or else they have no flashover problem at all. Unless the flashover has destroyed the string banding I would like to know why the traction motor would be removed from the locomotive.

Any damage done to the brushholder can be corrected by removing the brushholder assembly and repairing it on the bench as time permits, while replacing the damaged brushholder with a repaired one. This is the practice in many railroad shops and need not delay repairs to the traction motor.

If the commutator is damaged to such an extent that it requires retruing, it is possible to do this in the locomotive, and in fact this has been done in the locomotive for quite a few years on several properties. When the locomotive is equipped with roller bearings on the axle journals, it is very simple to jack up the journal box so that the wheel is lifted off of the rail and block the locomotive so that it will not move. Block appropriate line contactors so that they will not close, idle the diesel engine and furnish power to the traction motor from the diesel engine by letting the appropriate line contactor close. Two brushholders are left in the traction motor to furnish power to the commutator to cause it to rotate. The truing device is mounted in one of the brushholders and the commutator can be trued with the traction motor under the locomotive.

If rotating the traction motor by the locomotive power plant is not felt to be practical at a particular maintenance shop, the motor leads could be disconnected and the motor rotated by powering it from a welding machine. This is common practice for rotating traction motors when out from under the locomotive and on the shop floor.

Shops equipped with "drop tables" which drop single pairs of wheels and not the entire truck may find it convenient to spot the locomotive on the drop table rather than use journal jacks under the journal box.

If it is not desired to rotate the commutator for cleaning or other work as explained above there is no reason why the commutator cannot be moved around to the position required by the workmen by jacking the locomotive wheels along the rails with an ordinary car wheel jack or car mover.

Of course, if the flashover has caused the wire banding to be burned into or caused other damage which cannot be repaired without disassembling the traction motor, it is necessary to remove the motor from the locomotive. Practically any work that can be done on the traction motor without disassembling it when it is on the shop floor can also be done on the traction motor under the locomotive if it is desired to do it. It is recognized that working underneath the locomotive is a dirty, disagreeable, unhandy, miserable job and not as convenient as having the motor out on the shop floor. In many cases, working the motor underneath the locomotive will save considerable time and expense and get the locomotive back into service in much less time than changing a motor out.

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Railroad acceptance confirmed the soundness of this concept. And, continuing to meet the needs of railroad users, Pullman-Standard has added the PS-2 Covered Hopper, PS-3 Open Top Hopper and PS-4 Flat Cars to its standardized line.

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Contact with any Pullman-Standard office will bring full information about the specifications of the P-S line of standardized freight cars and their inherent benefits.

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North American Car Co.
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U. S. Army
U. S. Navy
U. S. Trans. Corps
U. S. War Department
Virginian
Wabash
Western Maryland
Western Pacific

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W191-Q—What does this feature constitute?
A—The brake cylinder maintaining feature.

Release and Recharge (Plate 1)

W192-Q—What must be done to release the brakes, following a brake application?
A—The automatic brake valve handle must be moved to Running position.

W193-Q—How does this movement affect brake pipe pressure?
A—Air from the feed valve now flows through port *20* to cavity *r* in the rotary valve, then to ports *1a and 1*, and then directly into the brake pipe.

W194-Q—How is equalizing reservoir pressure affected when the brake valve handle has been placed in Running position?
A—Air from passage *1a* also flows through cavity *j* and port *C* to chamber *D* above equalizing *piston 41*, and through port *5* to the equalizing reservoir.

W195-Q—What movement takes place at the distributing valve at this time?
A—Feed valve air, via port *1* in the brake valve, flows to distributing valve chamber *P* increasing the pressure there above that in the equalizing slide valve (pressure) chamber.

W196-Q—What movement then takes place?
A—The equalizing piston moves to the left, carrying slide and graduating valves to Release position as shown on Chart 1.

W197-Q—What is the air flow around the piston in this position?
A—Feed groove *v*, now open, permits brake pipe air to flow into the pressure chamber until the pressures are equal.

W198-Q—What pipe is connected to atmosphere in this position?
A—The distributing valve release pipe.

W199-Q—Describe the connections.
A—Through port *4*, exhaust valve *134* of the independent brake valve, port *19*, cavity *q* in the rotary valve of the automatic portion, and port *EX*.

W200-Q—What are the connections to the application cylinder and chamber at this time?
A—Since cavity *k* in the equalizing slide valve conects ports *4*, *i*, *w* and *h* in the valve seat, air in application cylinder *g* and chamber will escape through the distributing valve release pipe to the atmosphere.

Pamphlet 5046-15 (Page 40)

W201-Q—What action takes place as this pressure reduces?
A—Brake cylinder pressure will move the application piston *10* to the left until the exhaust valve uncovers exhaust ports *d* and *e*, allowing brake cylinder air to escape, or in graduated release, to reduce to application cylinder pressure.

Holding During Automatic Release (Plate 4)

W202-Q—How is the locomotive held applied and train brakes released?
A—The handle of the automatic brake valve is moved to the *Holding* position.

W203-Q—How do the ports now register?
A—All ports register as in the *Running* position except port *19*, which is closed. Port *19* leads to the distributing valve release pipe and application cylinder.

W204-Q—What results from this situation?
A—Any air pressure which may be in the application cylinder from a previous application is retained there, preventing the release of air from the locomotive brake cylinders.

W205-Q—What is the only difference between Running and Holding?
A—In the former the locomotive brake is released; in the latter the brake is held applied.

Emergency Position (Plate 5)

W206-Q—What is done to make the shortest possible stop?
A—The automatic brake valve handle is placed in the *Emergency* position.

W207-Q—What connections are made from the brake pipe in the Emergency position?
A—The brake pipe is opened directly to the atmosphere through port *1a*, cavity *y* and the exhaust port, causing an emergency reduction of brake pipe pressure.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F514-Q—What should follow?
A—Allow plenty of time, at least ten seconds for the power contactors *P-1* and *P-2* to open and the engine speed to come down to *idle*.

F515-Q—What then should be done?
A—Selector lever should be moved to *off*. Reverse lever must be in forward or reverse.

F516-Q—What takes place when selector lever is placed in *off* position?
A—This action will throw the cam switch from *motoring* to *braking* position and will double traction motor blower speed through action of the pole changer which is connected mechanically to the cam switch.

F517-Q—What must be done a few seconds after moving selector lever to *off*?
A—After a few seconds, move the selector until it latches in the *first* braking position.

F518-Q—What is the engine speed by this time?

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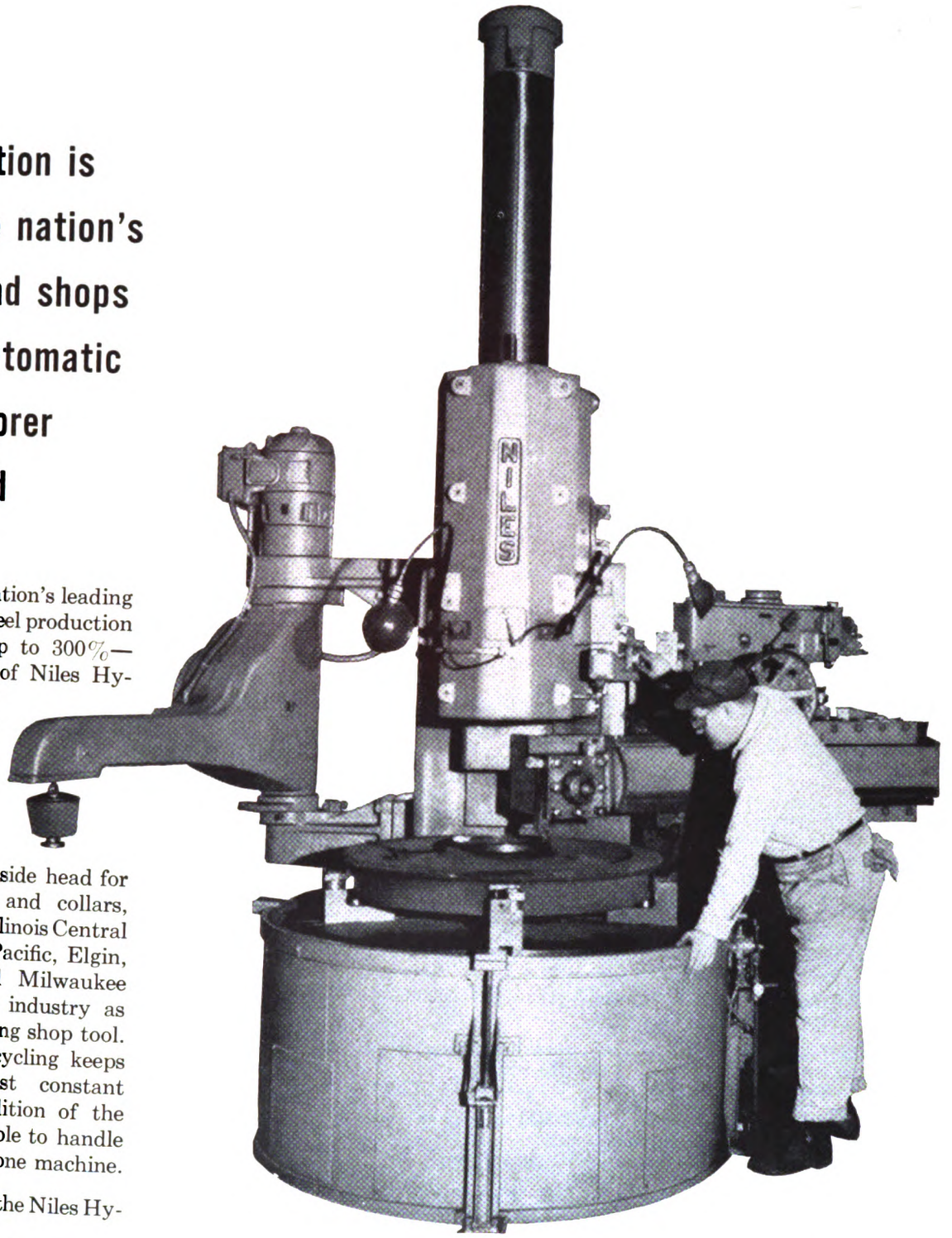

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QUESTIONS AND ANSWERS

A—The engine speed is increased from 300 to 380 rpm. (second notch).

F519-Q—What contactor closes and what is the result?
A—Power contactor *P-1* closes to connect the traction motor fields to the main generator but excitation is not applied.

F520-Q—What takes place if train speed is high?
A—Residual magnetism in the generator and exciter fields may cause sufficient braking effort to bunch the slack.

F521-Q—How is the braking effort indicated?
A—The load ammeter will indicate a reading which is a measure of the braking effort being produced.

F522-Q—What should be done after the slack is bunched?
A—The selector lever should be moved to the right, to give the desired amount of braking.

F523-Q—What precaution must be observed?
A—The ammeter pointer must not be allowed to go into the red area of the braking band on the scale.

F524-Q—Where is excitation applied?
A—Just beyond the first braking position, when a controller contact closes the field loop contactor, FL.

F525-Q—What happens on these units, if the braking grids are grounded?
A—The ground relay will trip, on the unit affected.

F526-Q—What should be done if the grids are wet?

Bulletin 1706, Sec. 110, Page 2.

A—Amperage should be held at a minimum for a few seconds to allow the grids to dry out before proceeding to heavier braking.

F527-Q—What is the rule on dynamic braking at 50 mph. or over?
A—Do not apply the dynamic brake beyond the first braking position at 50 mph. or over.

F528-Q—Why is this done?
A—This prevents exceeding the commutation limit of the traction motors.

F529-Q—What indication is given when the pointer enters the red area?
A—The brake warning light is set to come on at that time.

F530-Q—What may cause the warning light to come on while the pointer is still in the white zone?
A—Slight differences in characteristics between units.

F531-Q—What must be done if the light comes on?
A—The light governs, and braking must always be reduced until the light goes out.

F532-Q—What is the provision on some A unis in the event grid current becomes excessive?
A—A voltage relay is connected across the grid cooling fan to drop the dynamic brake.

F533-Q—Is a warning obtained first? Explain the reason.
A—Yes. This voltage relay is set slightly higher than the brake warning voltage relay, so that the warning is obtained first.

F534-Q—Does the automatic brake apply on the unit when the dynamic brake is in use?
A.—No.

F535-Q—What prevents the automatic brake from applying under such conditions?
A—An interlock on the D-24 Control Valve of each unit performs this function.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Freezing Weather Precautions.
Manual 2310, Page 223.

G592-Q—What must be done if locomotive is to be towed any appreciable distance in a train?
A—The reverse switch must be locked in the *neutral* position.

G593-Q—What must be done to effect this operation?
A—The locking pin, which during normal operation is screwed into the left hand side of the reverser housing, must be removed.

G594-Q—What should follow?
A—With the reverse lever in *neutral*, the buttons on top of reverser switch should be punched lightly, to center.

G595-Q—What must be done if control air is not available?
A—If control air is not available, place wrench on square portion of switch shaft and center the switch manually.

G596-Q—What must be done after the switch is centered?
A—If control has been used, shut it off. Insert a pin into the hole in the right side of reverser housing, pushing the pin all the way through the reverser switch shaft and screw pin into threaded hole in left side of reverser housing.

G597-Q—What must be the position of isolation switches?
A—All the isolation switches must be in the *start* position.

G598-Q—What must be done if it is necessary to keep the engines idling?
A—The fuel pump and control switches should be left in the closed position.

G599-Q—How should the air brake equipment be set?
A—According to the air brake manufacturer's bulletin.

Recovery of Brake after a Penalty Application.

G600-Q—In what position must the automatic brake valve handle be placed when attempting to recover after a penalty application?
A—Place automatic brake valve handle in *lap* position.

G601-Q—What should be the position of the throttle?
A—Close the throttle to idle.

G602-Q—What action should follow?
A—Place foot on safety control foot pedal.

G603-Q—What must we wait for at this time?
A—You must wait until the application pipe pressure builds up to main reservoir pressure.

G604-Q—In what way may the movement of application portion to release position be checked?
A—By listening for exhaust, or watching the PCS light.

G605-Q—What should follow?
A—Resetting the train control. Release of the brakes.

A lot of history has passed in our first hundred years. We have seen sweeping changes take place in every area of human experience. But Adams & Westlake has not changed in policy or in dedication to the maintenance of product quality.

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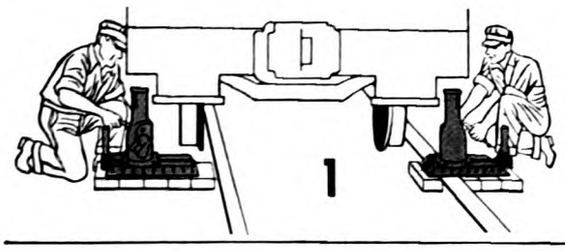
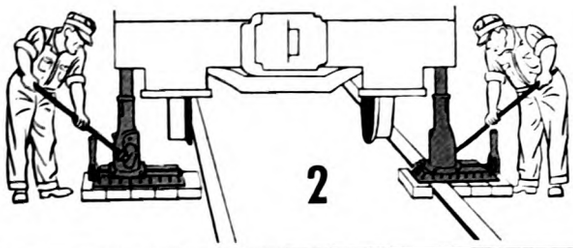
How to get back on the track quickly

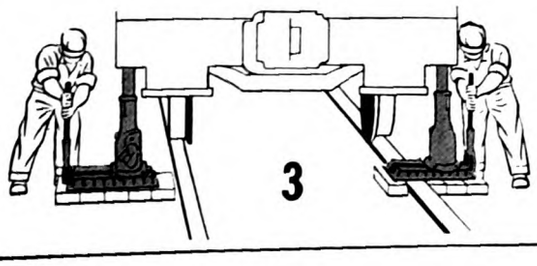
Without A Crane!



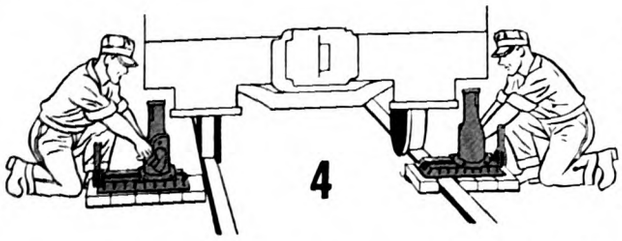
Place a *Duff-Norton traversing base and jack* beside each derailed truck.



Jack up the car or locomotive until wheels clear top of rails.

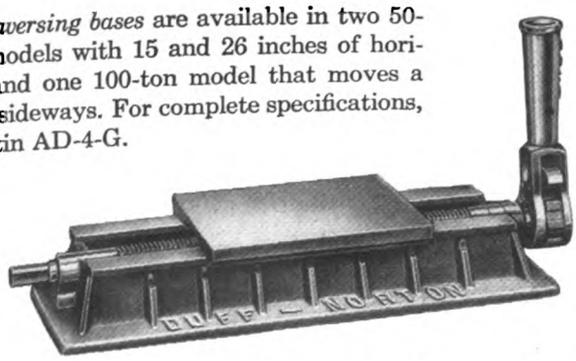


Move jacks horizontally simultaneously on traversing bases until wheels are in alignment with rails.



Lower wheels; you are back on the track, quickly, inexpensively and without danger of distorting car or locomotive frame.

Duff-Norton traversing bases are available in two 50-ton capacity models with 15 and 26 inches of horizontal travel and one 100-ton model that moves a load 20 inches sideways. For complete specifications, write for bulletin AD-4-G.



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Personal Mention

Atlantic Coast Line

Waycross, Ga.

E. L. SPICER, shop superintendent, Ga., appointed master mechanic.

J. C. PARKER appointed shop superintendent. Formerly general foreman at Rocky Mount, N. C.

Canadian National

R. DIXON, road foreman of engines, Montreal, appointed division master mechanic, Belleville division, Belleville, Ont.

Chicago & North Western

A. A. ENDERS appointed general master mechanic with jurisdiction over motive power and car departments, Chicago Terminal district, Chicago.

General foreman appointments: R. G. JACOBA, Green Bay, Wis.; H. G. CRONNOBLE, Chicago Avenue Enginehouse.

H. R. SPENCER appointed master mechanic, Lake Shore-Peninsula divisions, Green Bay, Wis.

Chicago, Milwaukee, St. Paul & Pacific

District general car foremen appointments: D. D. FISHER, Bensenville, Ill.; G. L. WOOD, Minneapolis; H. A. GROTHE, Milwaukee; J E. PALMER, St. Paul.

J. D. O'NEILL, assistant district general car foreman at Milwaukee, appointed general car foreman at Chicago.

Denver & Rio Grande Western

Denver, Col.

J. J. SCHMIDT, electrical engineer, appointed electrical research engineer, Burnham laboratory.

P. D. STARR, superintendent diesel equipment, appointed electrical engineer.

Erie

FRANCIS V. HUFF appointed road foreman of engines, Meadville division and B. & S.W. sub-division. Headquarters, Meadville, Pa.

Missouri Pacific

H. B. BANEY, mechanical superintendent, Gulf district, Palestine, Tex., retired.

P. E. LATSHA, terminal master mechanic, Osawatomie terminal, Osawatomie, Kan., appointed mechanical superintendent, Gulf district, Palestine, Tex.

L. W. MARTIN, road master mechanic, Eastern, Omaha and Northern Kansas divisions, appointed terminal master mechanic, Osawatomie terminal, Osawatomie, Kan.

E. E. DENT, appointed road master mechanic, Eastern, Omaha and Northern Kansas divisions, Kansas City, Mo.

J. W. MCCADDON appointed terminal master mechanic, Kansas City Terminal division, Kansas City, Mo.

Sedalia, Mo.

G. D. BALLEY, superintendent of shops, retired.

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reduced inventory
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MP-Continued

H. M. KELLY, general car foreman, appointed superintendent of shops.

Monon

CHESTER B. GAUGH, general mechanical foreman at Bloomington, Ind., retired.

New York Central

G. M. BEISCHER, master mechanic, Collinwood, Ohio, appointed assistant mechanical superintendent, Western district, Cleveland.

J. J. GREGORY appointed assistant to general mechanical superintendent-locomotive. Headquarters, New York.

New York Central

TECHNICAL RESEARCH DEPARTMENT APPOINTMENTS

New York

Assistant director of technical research: W. F. COLLINS.

Collinwood, Ohio

Manager, Research Laboratory: J. A. SMITH.

Manager, Research Group: T. R. FREDRIKS.

Research engineers: H. T. ROCKWELL, R. H. WRIGHT, L. C. SIMMONS, C. H. DERNER, G. L. RUNDEL.

Petroleum research engineer: W. S. BEAUREGARD.

Junior Research engineer: W. F. FREESE.

Supervisor oil test stations: R. E. O'DEA.

Cleveland

Supervisor diesel records: R. G. SAUERMAN.

Lube oil testers: J. S. ARCHER, Harmon, N. Y.; J. E. SALERNO, Syracuse.

Shop and equipment inspector: A. A. LAURIN, Syracuse, N. Y.

Richmond, Fredericksburg & Potomac

HARTWELL T. RAINEY, JR., chief car inspector, Richmond, Va., appointed superintendent car department.

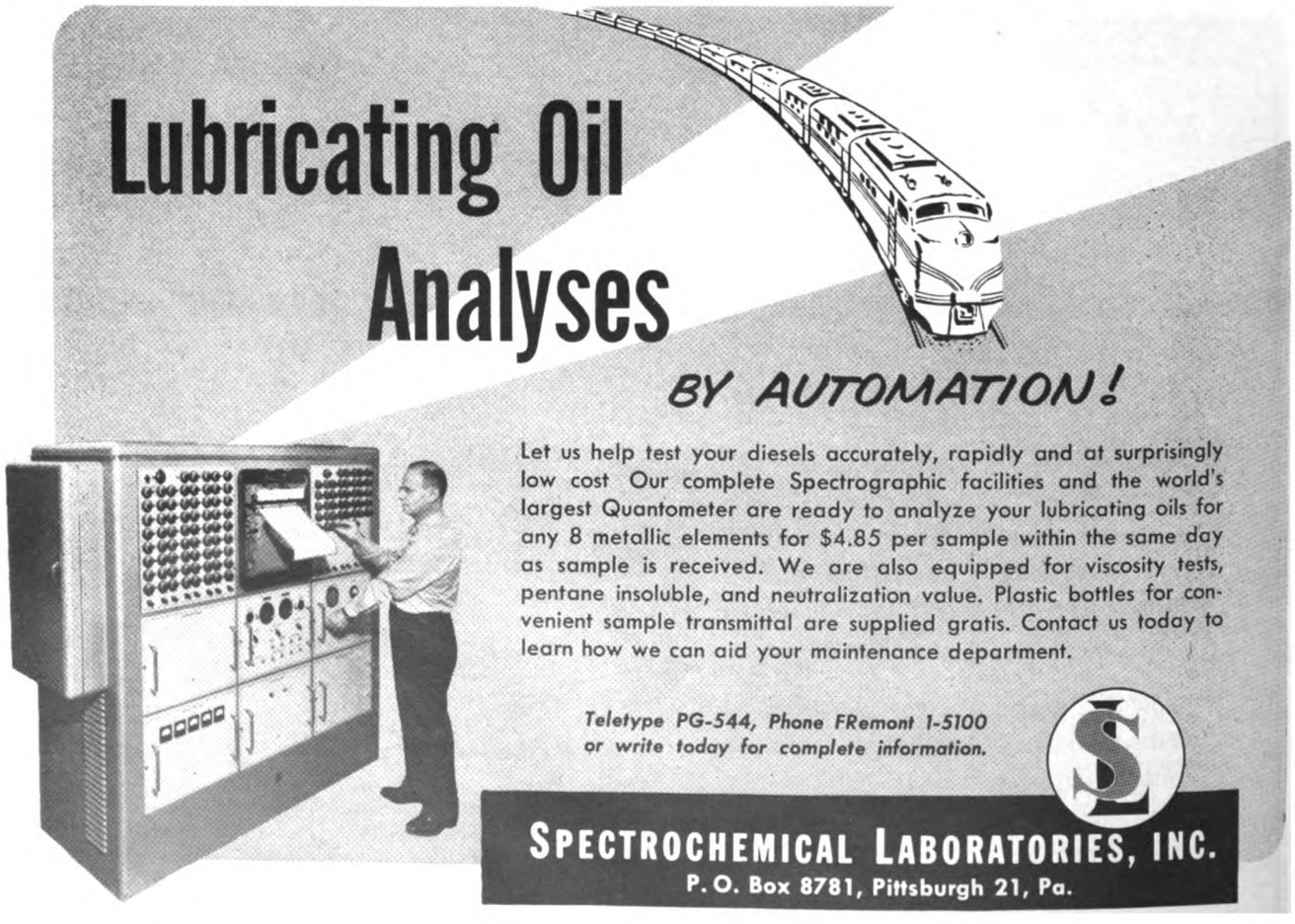
JAMES A. W. SMITH appointed assistant master mechanic at Potomac Yard, Alexandria, Va.

Supply Trade Notes

J. C. Janke

J. W. Morris

WESTINGHOUSE AIR BRAKE COMPANY, AIR BRAKE DIVISION.—*Joseph C. Janke* has been appointed district engineer, Southwestern District, at St. Louis. He was formerly on commercial engineering staff at Wilmerding, Pa. *John W. Morris* has been appointed representative, Southwestern district, at St. Louis.



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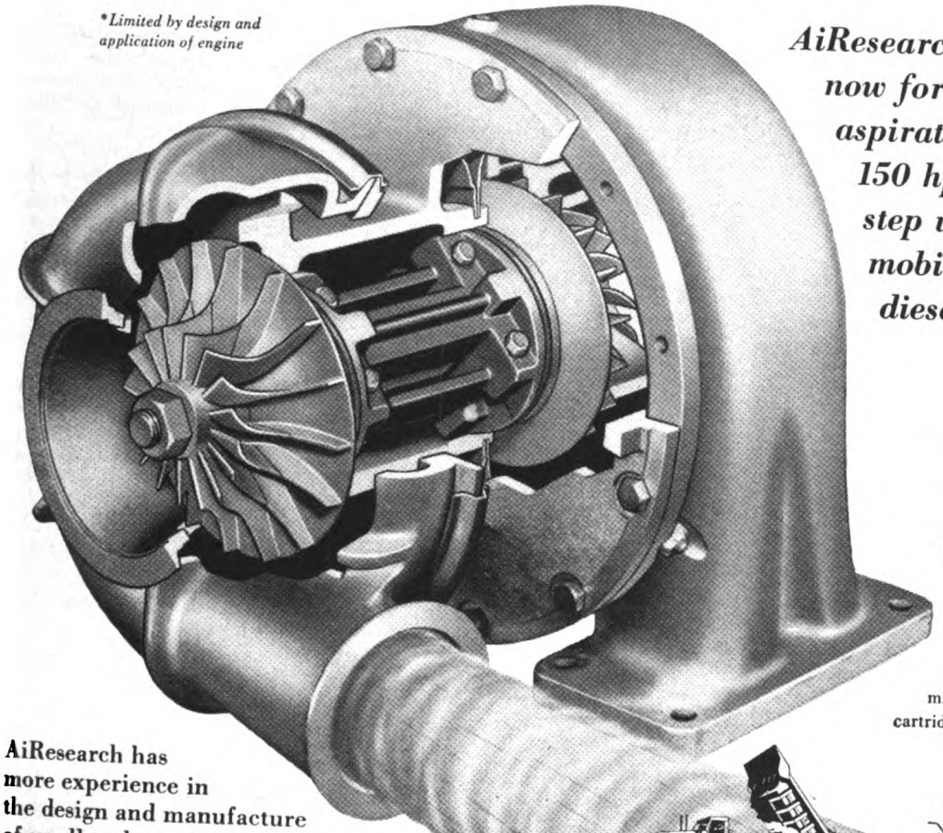
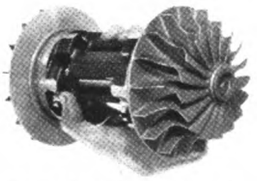


AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.



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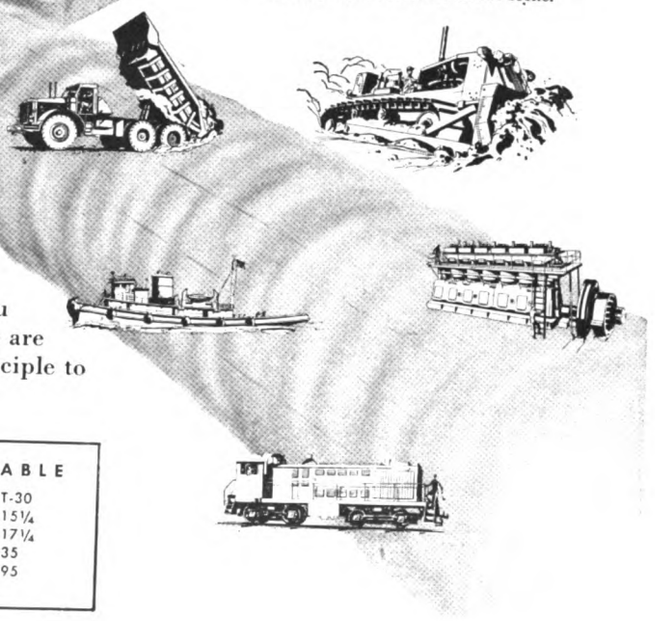
Our engineers welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on applications of the turbocharger principle to your power plants.



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Diameter — in. nom.	9	15¼	11½	15¼
Length — in.	9	16¾	15¾	17¼
Weight — lb.	39	125	100	135
Output — lb/min. (Standard Conditions)	25-40	35-65	45-65	70-95

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DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

He was previously assistant district engineer, Eastern District, at New York.

■

KAISER ALUMINUM & CHEMICAL CORP.—Kaiser has purchased the wire and cable business of *United States Rubber Company*. The purchase includes wire and cable inventories and the Bristol, R.I., insulated wire plant, for which U.S. Rubber will continue to supply rubber for wire insulation.

■

EX-CELL-O CORPORATION.—*Jack L. Mustard*, assistant sales manager of the industrial division, has been appointed sales manager of the division, at Detroit.

Ex-Cell-O has acquired the *Cadillac Gage Company* of Roseville, Mich., and the *Smith Bearing Company*, Trenton, N.J., through exchange of stock. Both will operate as separate units under existing managements. Cadillac Gage produces a line of plug and ring gages and several special mechanisms, while Smith Bearing Company produces anti-friction needle bearings.

■

McGRAW-EDISON COMPANY.—*Thomas A. Edison, Inc.*, and *McGraw Electric Company* have merged to become the McGraw-Edison Company.

■

ACME STEEL COMPANY.—The general offices of Acme are now at 135th and Perry avenue, Chicago 27.

■

STANDARD RAILWAY EQUIPMENT MANUFACTURING CO.—The *John Gillen Company*, Cicero, Ill., has been acquired by, and will be operated as a division of Standard.

■

GENERAL STEEL CASTINGS CORP.—*W. Ashley Gray, Jr.*, has been appointed assistant to vice-president-sales at Granite City, Ill., representing western railroads. *Winthrop B. Reed*, manager, industrial sales, has been appointed manager-eastern sales, Eddystone, Pa.

■

JOSEPH T. RYERSON & SON, INC.—*Scott Vrooman* has been appointed sales manager at Detroit. *Bruce D. Clausonthue* succeeds Mr. Vrooman as sales manager at Chicago.

■

BULLARD COMPANY.—*Clifford H. Hagberg*, district manager of Chicago, has been appointed assistant sales manager, and *Edward A. Sundstrom* has been appointed district manager at Chicago. Mr. Sundstrom was previously in the sales department at Philadelphia.

■

THOR POWER TOOL COMPANY.—The executive offices of Thor have been transferred from Aurora, Ill., to the Prudential Building, Chicago. Martin A. Bertram, a service engineer, has been appointed manager of the new Great Lakes electric tool sales zone.

■

TRANE COMPANY.—*James Whalen* has been appointed manager and *Kenneth Shannon*, assistant, in the transportation sales department. *Donald J. Girard* has been appointed manager of the sales office at Syracuse, N. Y., succeeding *James H. Hanchett*, retiring. Mr. Hanchett will continue as a sales representative in northern New York state.

■

CHROMIUM CORPORATION OF AMERICA.—*Donald H. Bissell* has been elected president, and *Charles H. Belvin* succeeds him as vice-president and secretary.

■

DEVILBISS COMPANY.—The midwestern sales area has been realigned. The company's Chicago branch will be headquarters for the north central division under *Jack E. Kennedy*, divisional sales manager. The St. Louis branch will be headquarters for the midwest sales area, under *Edward F. Luzius*, divisional sales manager. Both Mr. Kennedy and Mr. Luzius had been managers of their local branches.

■

BUDD COMPANY.—*W. L. Sheppard* has been appointed vice president and general manager of the Railway Division, in charge of all operations related to the sale and maintenance of railway passenger train car products.

■

GOULD-NATIONAL BATTERIES.—*R. W. Hopewell* has been appointed manager of field engineering for the industrial division, at Trenton, N. J.

■

TIMKEN ROLLER BEARING COMPANY.—A two-story building, containing approximately 10,000 sq ft on each

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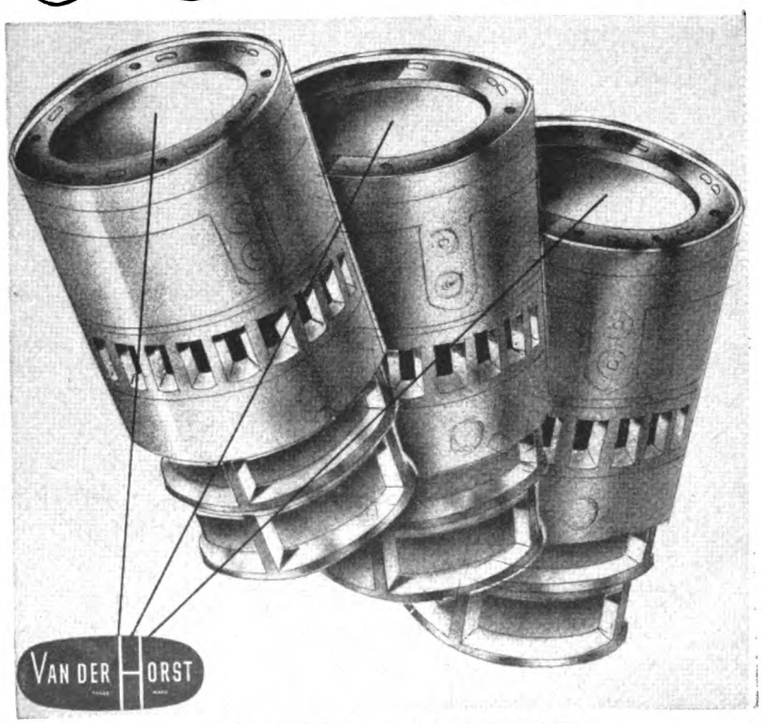

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*SparTan Engineering

floor, will be erected across from the main offices of Timken in Canton, Ohio. The building will house physical, railroad research, electronic, photographic and lubrication laboratories.

■

RUST-OLEUM CORPORATION. — A $500,000 addition to the company's plant at Evanston, Ill., has recently been completed, adding 10,560 sq ft to manufacturing facilities as well as additional administrative space.

■

PULLMAN-STANDARD CAR MANUFACTURING COMPANY. — *J. W. Miller* has been appointed sales representative for Birmingham and Washington, D. C., sales office.

■

NATIONAL MALLEABLE & STEEL CASTINGS COMPANY.—*Mellor W. Stevenson* has been appointed general manager-sales, Railway Division at Cleveland. *Howard Stark* succeeds Mr. Stevenson as sales manager, Railway Division, in the St. Louis office.

■

OAKITE PRODUCTS, INC.—The following transfers have been made in the Oakite technical field service organization: *E. Lacy* from Detroit to Houston, Tex.; *R. W. Krajicek* from Billings, Mont., to Lake Charles, La.; *B. B. Herron* from Odessa to Beaumont, Tex., and *Horace V. Wells* from San Antonio to Corpus Christi, Tex. New representatives are *Robert H. Bourbonnais* at Lansing, Mich.; *J. C. Ruttle* at Detroit; *Harry H. Thomas* at Cedar Rapids, Iowa; *William G. Caffee* at Birmingham, Ala.; *Andrew C. Johnston* at Washington, D.C., and *Theo L. Matula* at San Antonio, Tex.

■

A. M. BYERS COMPANY.—*B. M. Byers*, vice-president in charge of sales, has been elected president to succeed *J. Frederick Byers, Jr.*, who has been elected chairman of the board. *Ramon I. Lindberg* has been appointed director of corrosion research.

■

REYNOLDS METALS COMPANY.—*Neil W. Zundel* has been appointed manager of transportation market sales at Louisville, Ky.

■

HUNT-SPILLER MANUFACTURING CORPORATION.—*Ellis E. Walker, Jr.*, formerly assistant manager of special service, Boston & Maine, has been added to the railroad sales staff of Hunt-Spiller.

■

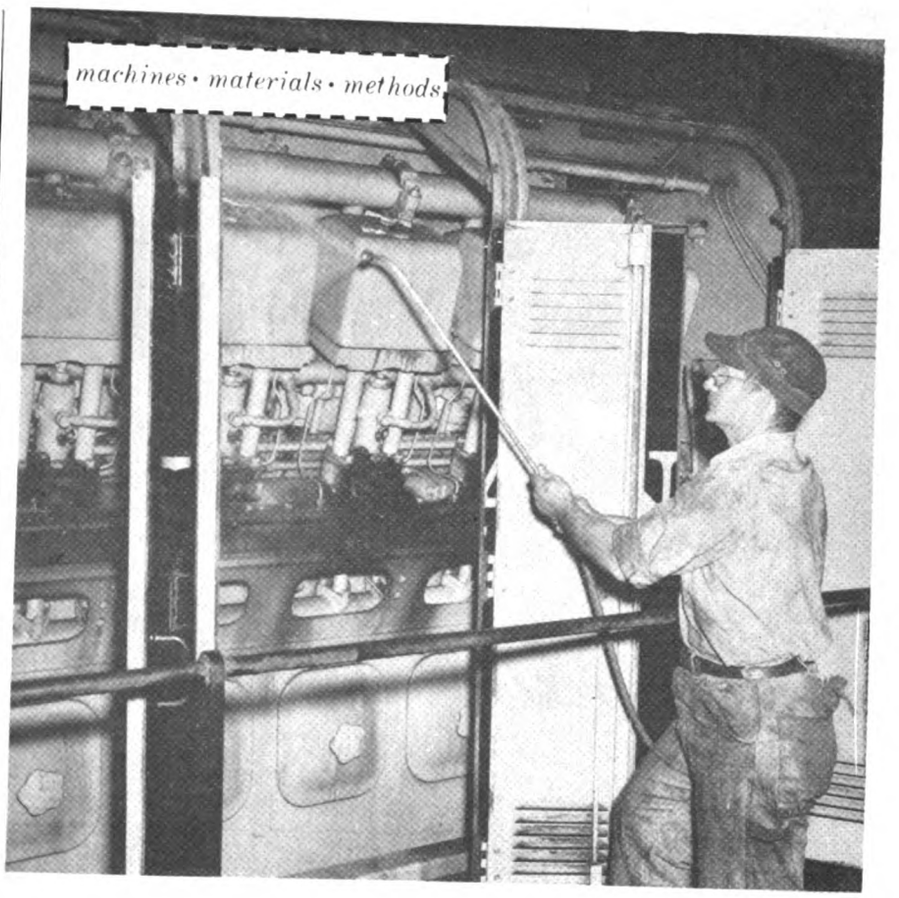
DUFF-NORTON COMPANY.—*T. W. Krueger*, assistant sales manager, has been appointed sales manager of the Jack Division.

■

WILSON ENGINEERING COMPANY. —*A. T. Cox, Jr.*, of Cox-McGeorge Company, Cleveland, has been appointed by Wilson as exclusive representative for railroads.

■

EATON MANUFACTURING COMPANY.—*John C. Virden*, director and member of the executive committee, has been elected president, succeeding *Howard J. McGinn*, who has held the dual positions of president and board chairman, continues as board chairman.



Cut Down on Cleaning Time in Diesel Interiors

Cleaning engine exteriors, floors, walls need not be a time-consuming job. You can cut down on time and manpower with Magnus Diesel Magnusol.

Safe and Sure . . . Magnus Diesel Magnusol is a fast-working easily applied cleaner. Just mix the concentrated cleaner with water . . . spray it on all surfaces to be cleaned . . . After soaking for a short time, flush the cleaner and dirt away with water. Surfaces are really clean! Diesel Magnusol is harmless to paints, metals and personnel and is non-toxic and non-flammable.

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RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.

a world-wide organization specializing in cleaning and protection of all surfaces.

The truth about railroad

Why can some manufacturers sell cleaning compounds for less than others?

Some manufacturers are "compounders," who buy their ingredients wholesale and mix them. Others are "canners," who buy somebody else's cleaning products at an advantageous price, package them, and resell them. Neither one carries on any research of consequence. They seldom develop any new products or improve existing ones. They do not guarantee the quality or uniformity of their products. They are not in a position to give their customers service.

What effect does the price-per-pound of the cleaning product have on the over-all cleaning cost?

Almost none! About 90% of the cost is labor, and much of the rest goes for equipment, steam, etc. The amount spent for cleaning compounds is a very small fraction of your total cleaning bill.

Then what is the true measure of cleaning costs?

Actual cleaning results and unit cleaning costs are what count—how much it costs you to clean a diesel, strip paint from a boxcar, clean a ton of parts or a passenger car.

Who can tell you if you're getting good cleaning results or not?

Ask the men in your mechanical department who are actually responsible for the cleaning operations. They know the difference between a product made

cleaning costs

Here are some frank answers to some pertinent questions:

to sell at a price and a product that is research-developed to do the job better at a lower unit cost.

Why can your Wyandotte representative help you get better cleaning results?

Your Wyandotte representative has been in the railroad cleaning business a long time. He knows what your cleaning operations *should* cost, and he is familiar with the cleaning methods and procedures that will reduce your costs to an absolute minimum. What's more, he's backed by a manufacturer that owns its own raw materials, carries on extensive research and product-development programs, and offers valuable technical service. He's been cutting cleaning costs for years. Call him in. Let him start cutting yours today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

Wyandotte CHEMICALS

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J. B. FORD DIVISION

COMPLETE LINE OF CLEANERS FOR ALL RAILWAY NEEDS

The easiest way to restore commutators in traction motors and generators without dismantling during interim maintenance...or during periodic overhauls. IDEAL Resurfacers and other tools are used by leading railroads and recommended by locomotive builders.

RESURFACERS

Refinish commutators to like new condition even when ridged, scored or burned. Wood block handles clamp rigidly into grinder. Seven sizes, in all grades from extra coarse to extra polish.

MICA UNDERCUTTERS

Work easily in close quarters. Several models. Direct drive or by flexible shaft. For use with IDEAL Commutator Saws and Milling Cutters.

FLEXIBLE ABRASIVE

Cleans and burnishes commutators. Non-dusting. Complete size range.

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Blows air at high velocity and harmless low pressure. Lightweight and rugged. May also be used as a vacuum cleaner or sprayer. Three models: ⅖, ⅔ and 1⅓ H.P.

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Complete information on commutator maintenance.
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EQUIPMENT

(Continued from page 12)

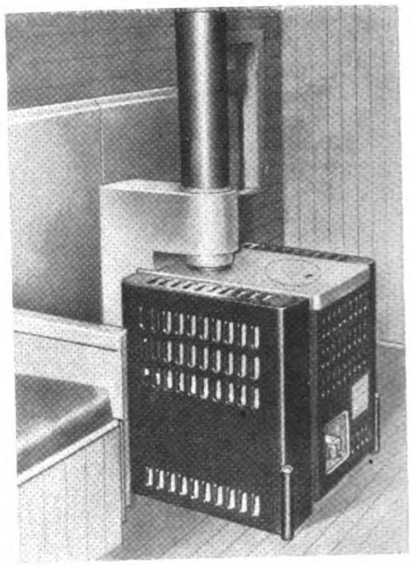
Caboose Heater

The Vapor Caban Heater No. 55 features a special design vaporizing burner to burn regular diesel locomotive fuel oil. It will also burn No. 1 fuel oil and kerosene. The fuel control is adjustable, giving a maximum output of 55,000 BTU per hr.

The heater gives off heat, both radiant heat and convected heat. Air from the floor flows through lower openings at sides and front, and is heated by passing over the outer surfaces of the firepot. It then flows out the upper openings. A special barometric draft control is at the back.

A cast-iron surface on top of the heater is for cooking purposes. In the

(Continued on page 94)



HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

OIL HARDENING TOOL STEEL. 4-page bulletin gives typical analysis, heat treatment and forging practice of Ry-Alloy oil hardening steel. This material can be supplied in rounds, squares and flats and features safe hardening, minimum distortion and good machinability. (Write: *Joseph T. Ryerson & Son,* Dept. RLC, Box 8000-A, Chicago 80.)

AIR TOOLS. 84-page catalog No. 53 contains complete descriptions and specifications of all Thor industrial air tools, including new direct drive right angle nutsetters, vertical and die grinders, etc. (Write: *Thor Power Tool Company,* Dept. RLC, Aurora, Ill.)

LATHES. 80-page catalog No. 5700 replete with illustrations, descriptive data, and specifications on engine lathes, toolroom lathes, turret lathes, vertical spindle milling machines, bench shapers, drill presses and pedestal tool grinders. attachments, tools, chucks and accessories for all South Bend machine tools also listed. Specifications include capacities, floor space requirements, etc. (Write: *South Bend Lathe Works,* Dept. RLC, South Bend 22, Ind.)

FIBERGLAS. 54-page booklet, "Fiberglas Is Working on the Railroad," illustrates, in color, broad range of thermal, acoustical and electrical insulations, fireproof fabrics, coated fabrics, and reinforcement for plastics for use in the construction and maintenance of rolling stock, buildings, fixtures and furnishings. (Write: *Owens-Corning Fiberglas Corporation,* Dept. RLC, Toledo 1, Ohio.)

MARKERS. Bulletin illustrates and describes a new permanent method of coding wire with plastic tubular markers to identify complicated thermoplastic wiring circuits. (Write: *E. C. P. Corporation,* Dept. RLC, 6808 Wade Park ave., Cleveland 3.)

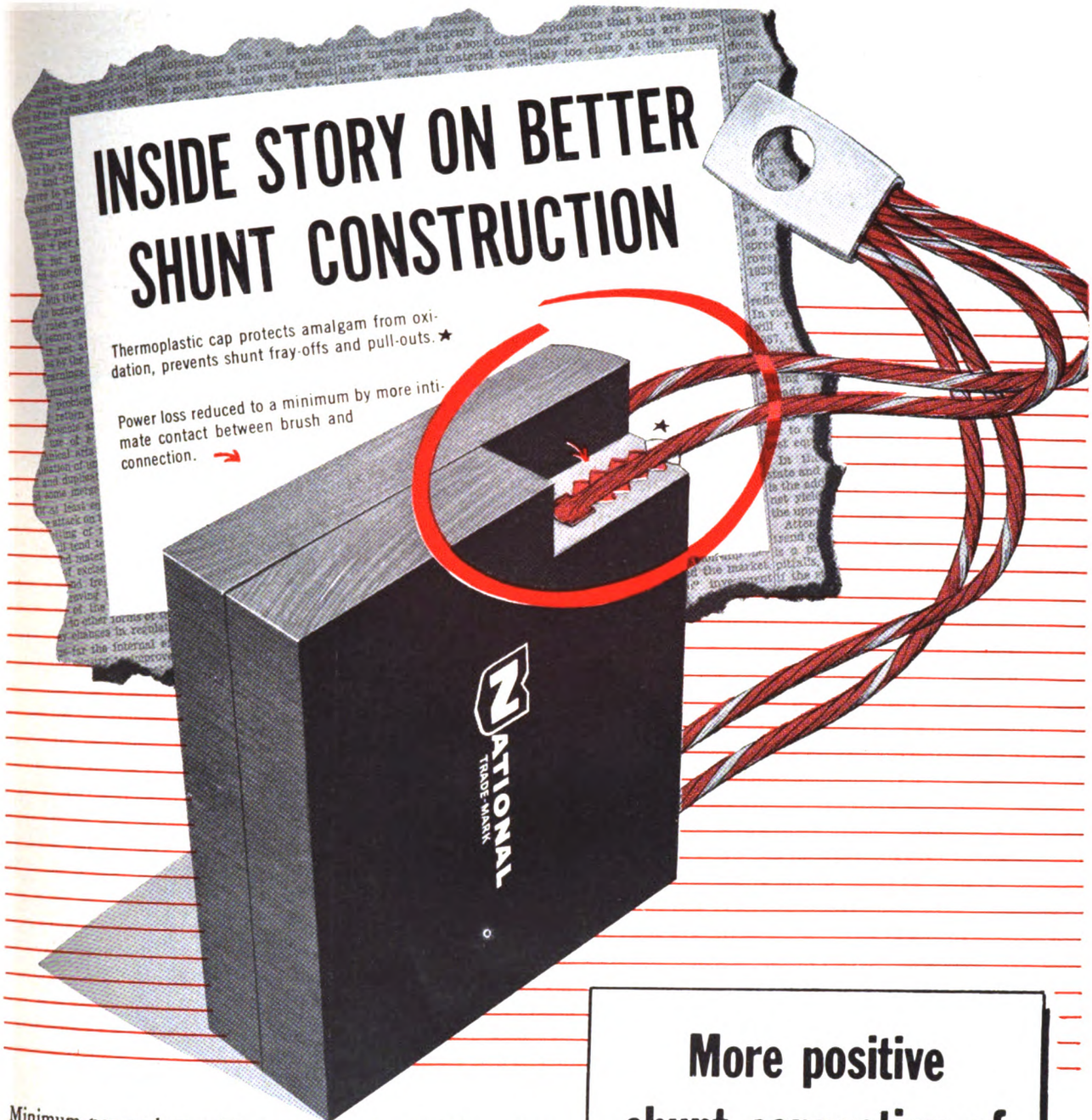
STORAGE BATTERIES. 8-page technical report, Bulletin No. 501, descriptive of Nicad sintered plate storage batteries, helps evaluate the practicability of miniature Nickel Cadmium batteries for switchgear, diesel-engine starting and portable electrical equipment. Details of development, construction and operation shown, also curves of discharge and charge characteristics. (Write: *Nickel Cadmium Battery Corporation,* 66 Pleasant street, Easthampton, Mass.)

AIR HAMMERS. 4-page catalog describes the Ramex air hammer, Model AR-4, with specifications. 4-page price list includes drawings and size data about each of more than 40 different tools and accessories available for use with the hammer. (Write: *E. V. Nielsen, Inc.,* Dept. RLC, 129 Broad st., Stamford, Conn.)

ARC WELDING MACHINES. Arc welding machines for metal fabrication, construction and repair in the plant, shop and in the field described in new Airco catalog, Form ADC 708C. Specifications for each machine, from ampere ratings to outside dimensions, included. (Write: *Air Reduction Sales Company, a division of Air Reduction Company,* Dept. RLC, 150 East 42nd street, New York 17.)

CHANNELCROMIUM. 4-page Bulletin No. 74 describes Channelcromium and shows, in sequence, its application on the bore surfaces of diesel-electric locomotive engine liners. (Write: *Pennington Channelcromium Company,* Dept. RLC, 319 Dakota street, San Antonio 3, Tex.)

INSIDE STORY ON BETTER SHUNT CONSTRUCTION



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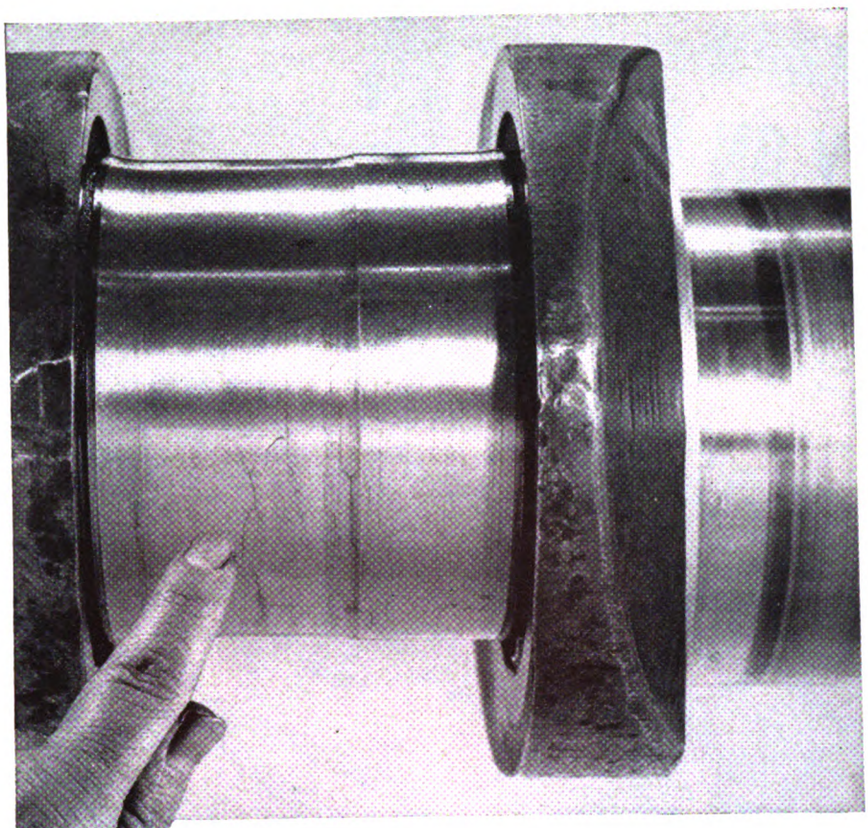
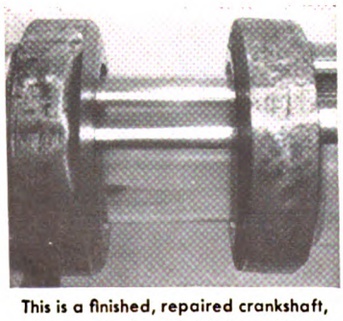


THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-1

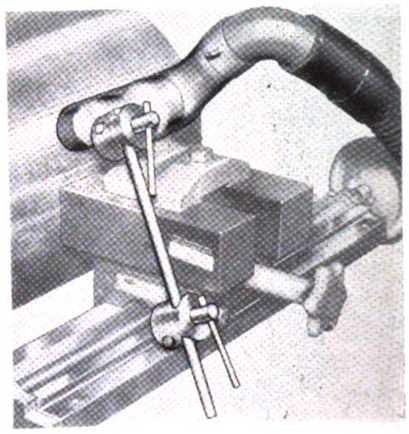


This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE
AND ORDNANCE COMPANY
Irvine (Warren County), Pa.

center of this surface is a small cast-iron removable lid through which the heater can be lighted. In high mountain areas, the caboose heater can be fitted with an electric blower.

The heater is 30 in. high, 29 in. wide and 26½ in. deep, making it adaptable for use also in work cars, camp cars and small buildings. The approximate weight is 165 lb. *Vapor Heating Corporation, Dept. RLC, 80 East Jackson Blvd., Chicago 4.*



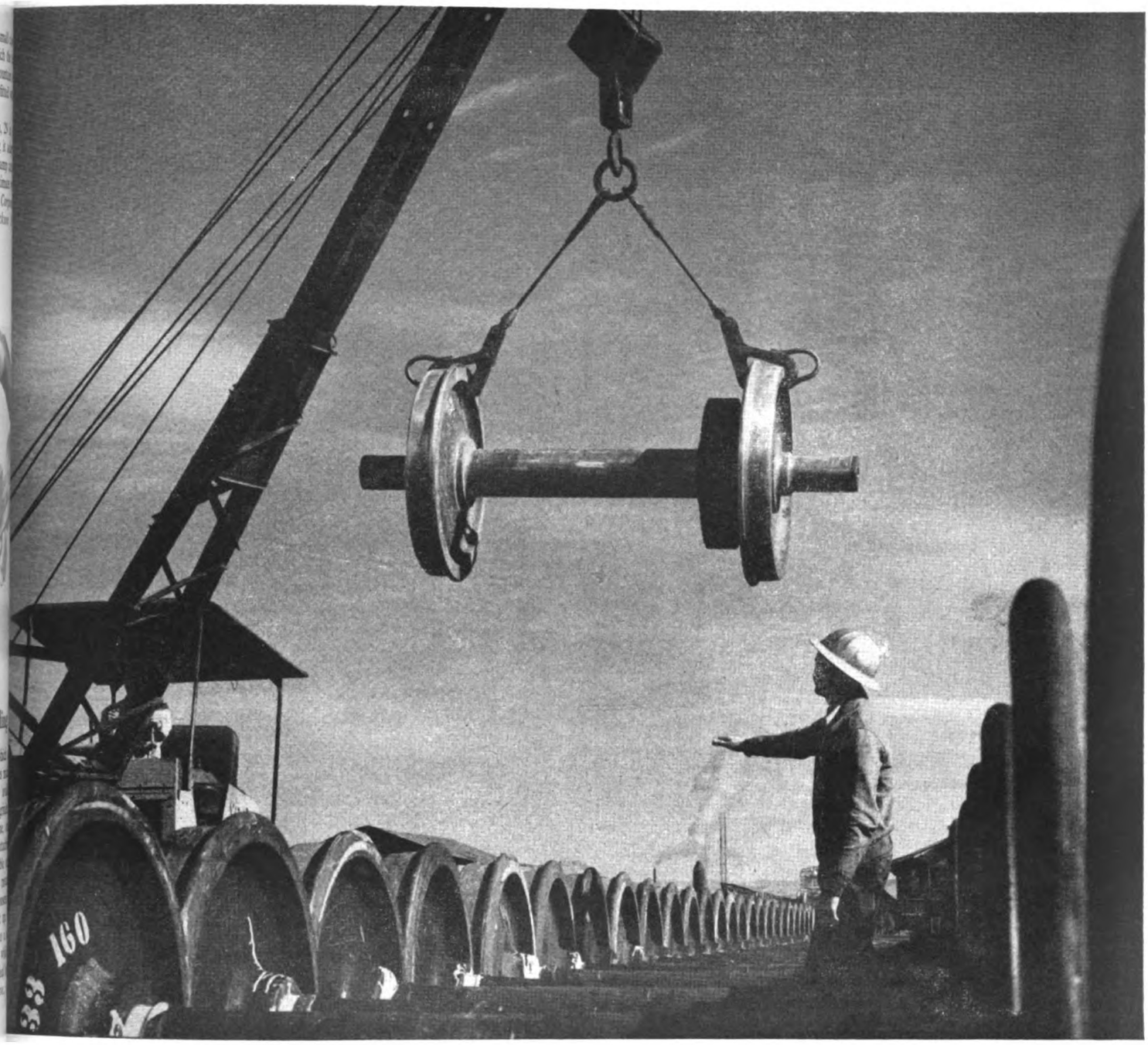
Dustless Commutator Grinding

A vacuum dust collector which picks up the dust and metal particles made by commutator grinding is now available. It may be mounted on the grinder on the generator or motor frame, and it utilizes an industrial vacuum attachment. The unit includes an adjustable nozzle with brush and all necessary mounting brackets. The nozzle brush loosens the dust and the vacuum picks it up. Machinery clean-up time is cut to a minimum because dust is collected while the grinding job is being done. *Ideal Industries, Dept. RLC, 1563 Park ave., Sycamore, Ill.*

Safety Detergents

Composition No. 117, a solvent detergent which with a reported safety factor, has been designed to remove grease and oil, where water cannot be used. Offered as equally effective in cleaning electrical equipment, diesel cabs, and engine compartments, with a flash point of 185 deg, this solvent has an exposure tolerance rating two and a half times greater than trichlorethylene and twenty times that of carbon tetrachloride.

Used full strength, applied by brush, immersion, or a non-atomizing spray, parts may be blown dry with compressed air. This material may be diluted with up to equal parts high flash petroleum distillate, if necessary. *Oakite Products, Inc., Dept. RLC, 146 Rector street, New York 6.*



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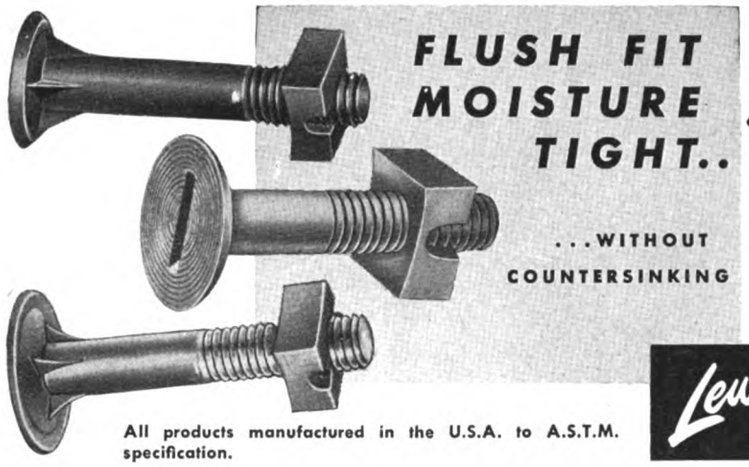
Terse, timely, authoritative . . . RAILWAY AGE brims with the fresh trends, new slants and cost-saving procedures that pay off in profitable operations. That's why heads-up equipment sellers use it to bring product advantages fingertip-close to railroad management. That's why you, too, belong here . . . in RAILWAY AGE!

Talk *business* to railroad *management* in... **RAILWAY AGE**

SIMMONS-BOARDMAN · 30 CHURCH ST., NEW YORK 7, N. Y. (ABC-ABP)

Workbook of the Railways



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Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

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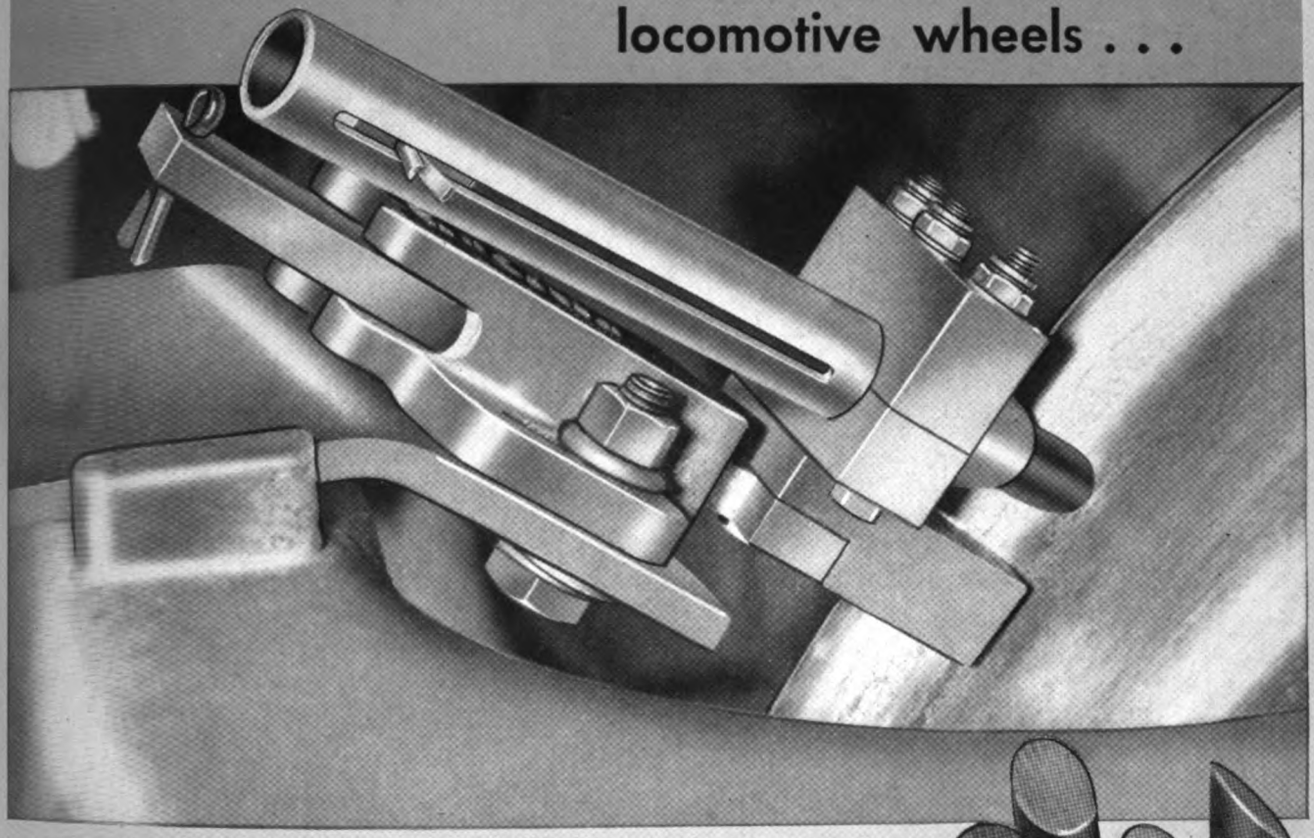
"This index is an editorial feature maintained for the convenience of readers. It is not a part of the advertiser's contract and Railway Locomotives & Cars assumes no responsibility for its correctness."

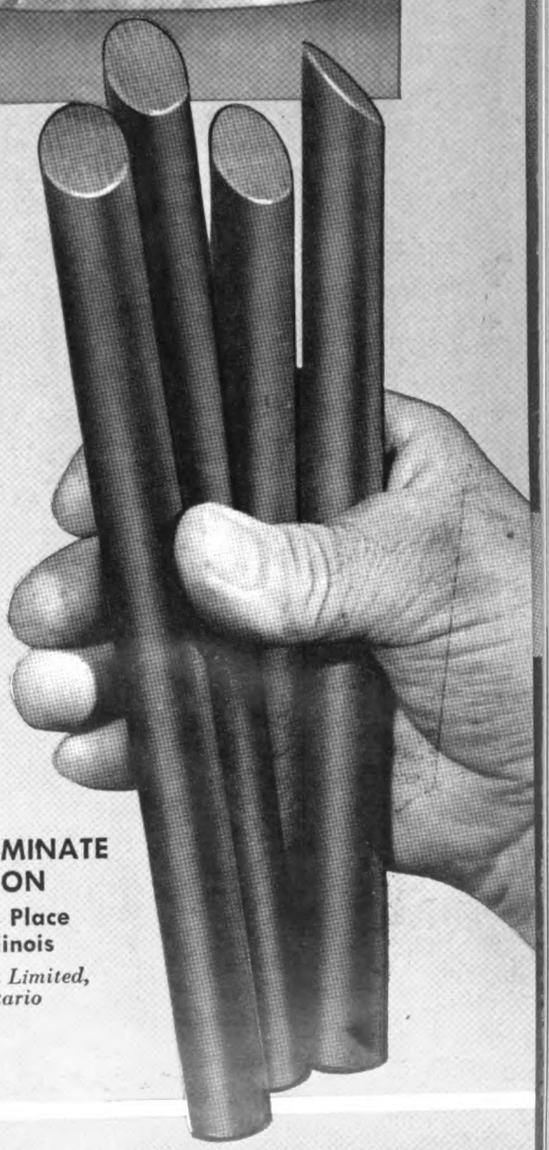
This simple device on your diesel or steam locomotive wheels . . .



. . . loaded with Nalco "Moly" Stick dry lubricant . . .

. . . gives you

- Better flange lubrication
- Lowered lubricating costs
- Longer wheel life
- Less lubricator maintenance
- No traction losses
- No track fouling



SIMPLICITY, plus low installation and upkeep costs for *really effective dry flange lubrication* are yours with Nalco "Moly" Stick Lubricators. This new concept in flange lubrication utilizes a molybdenum disulfide type lubricant which has high film strength under pressure and does not pick up dirt or other abrasives. Tests in service show that "Moly" Sticks provide better lubrication and far outwear any other type of stick lubricant.

Write for Bulletin 551 for more cost-saving data on Nalco Flange Lubricators — Or ask your Nalco Representative for details.

NATIONAL ALUMINATE CORPORATION
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Chicago 38, Illinois
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Nalco®

PRODUCTS . . . Serving the Railroads through Practical Applied Science

THE TAPER MAKES TIMKEN® THE ONLY JOURNAL BEARING THAT DELIVERS WHAT YOU EXPECT WHEN YOU BUY A ROLLER BEARING

YOU put car journals on roller bearings for only two reasons: to end the hot box problem and to cut operating and maintenance costs to a minimum. Timken® tapered roller bearings are the only bearings that do both. It's the taper. Here's why:

1. NO LATERAL MOVEMENT WITHIN THE BEARING. Timken bearings *roll* the load. They never slide it. There's no scuffing of rollers and races to shorten bearing life. No lateral movement to force lubricant through the seal, out of the journal box, and onto the rails to cause costly diesel locomotive wheel slip. You save the cost of lost lubricant, plus its replacement cost.

2. POSITIVE ROLLER ALIGNMENT. The taper in Timken bearings holds ends of rollers snug against the cone rib, where wide area contact keeps them properly aligned. There's no skewing of rollers to upset full line contact.

Unlike costly devices that merely act as "crutches" in an attempt to improve friction bearing performance, Timken bearings do away with the *cause* of hot boxes —the friction bearing itself. What's more, they bring maximum operating and maintenance savings. Fact is, the new heavy-duty type AP (All-Purpose) Timken journal bearing assembly will go three years without adding lubricant. Lubricant cost is cut as much as 95%. Terminal bearing inspection time is reduced 90%.

So, to end the hot box problem and slash operating and maintenance costs to the minimum, be sure you get Timken *tapered* roller bearings. The taper makes them deliver. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN *TAPERED ROLLER BEARINGS ROLL THE LOAD*

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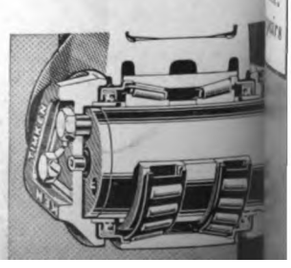

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RAILWAY LOCOMOTIVES AND CARS

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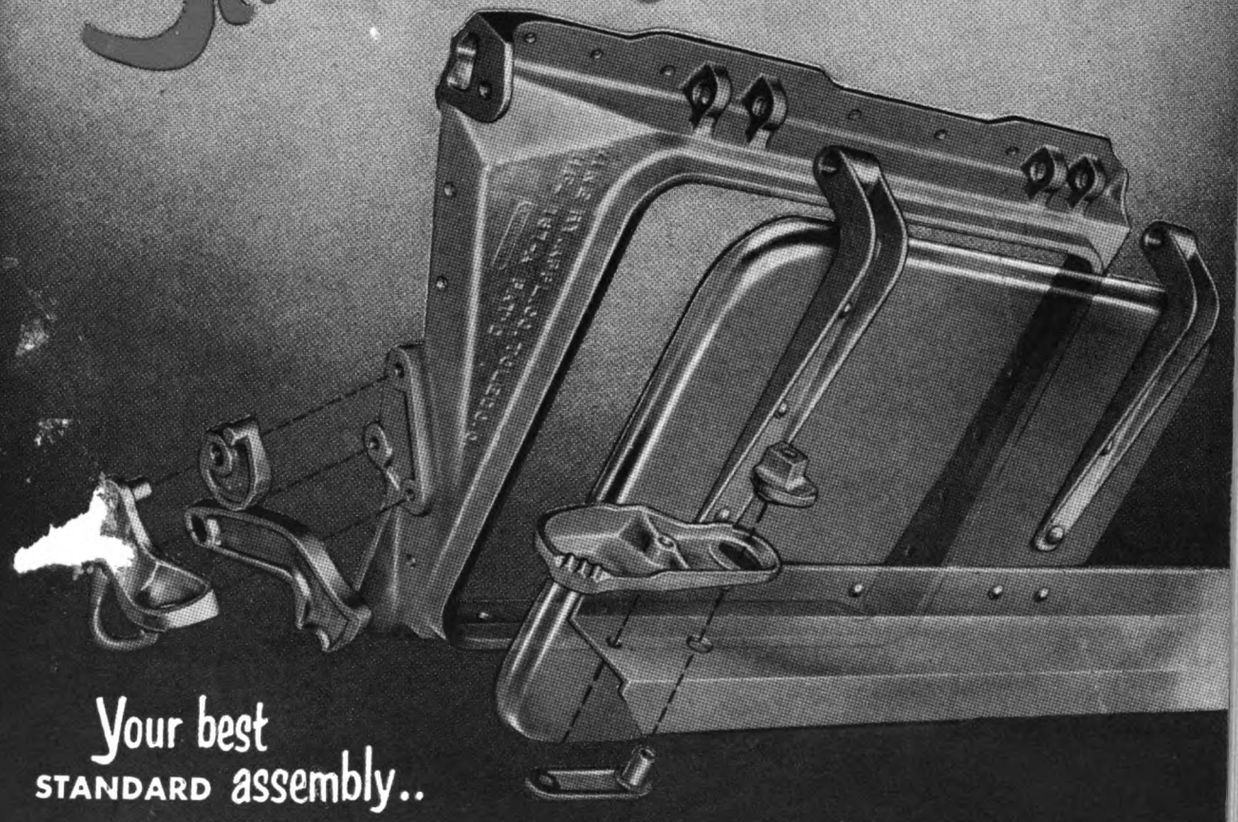

Your best STANDARD assembly..

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Hopper Frames, Adjustable Locks and Hinges

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

PROVED!

DEPENDABLE TRACTION MOTOR GEAR LUBRICATION FOR OVER 6 MONTHS WITHOUT GREASE ADDITION!

NEW ESSO ARAPEN GEAR LUBRICANT

Extensive 18 month on-the-road tests by the New York Central Railroad have *proved* that Esso Standard's new Arapen Gear Lubricant gives completely dependable traction motor gear lubrication for well over six months. During the six-month periods *no* additional lubricant was required. Arapen outlasted the previously used lubricant by at least 6 to 1!

NEW YORK CENTRAL SYSTEM

New Esso Arapen Gear Lubricant is another exclusive development of Esso Research. For further information and technical assistance in the use of Arapen Gear Lubricant, call your local Esso office, or write: Esso Standard Oil Company, Railroad Sales Division, 15 W. 51st Street, New York 19, N. Y.

Performance advantages of **ARAPEN GEAR LUBRICANT:**

Reduced Leakage: maintains consistency through full range of operating temperatures, minimizing drippage on ties, pits and station platforms.

Improved Oxidation Stability: permits extended operation without hardening.

Excellent Structure Stability: reduces failures due to dry gears caused by excessive gear case leakage.

Better Anti-Wear Characteristics: high grease retention assures proper gear protection for prolonged time.

Esso

RAILROAD PRODUCTS

HOW EFFICIENT IS THIS OPERATION?
HOW GOOD IS THE FINISHED PRODUCT?

Whether you are concerned with manufacturing or with purchasing rolling stock, these are questions of vital concern to you—for ultimately they govern the durability and cost of the end product. Here is just one example how HELIARC welding is helping railroads gain new product quality at substantial savings . . . the unit being fabricated is a galvanized iron and mild steel refrigerator car.

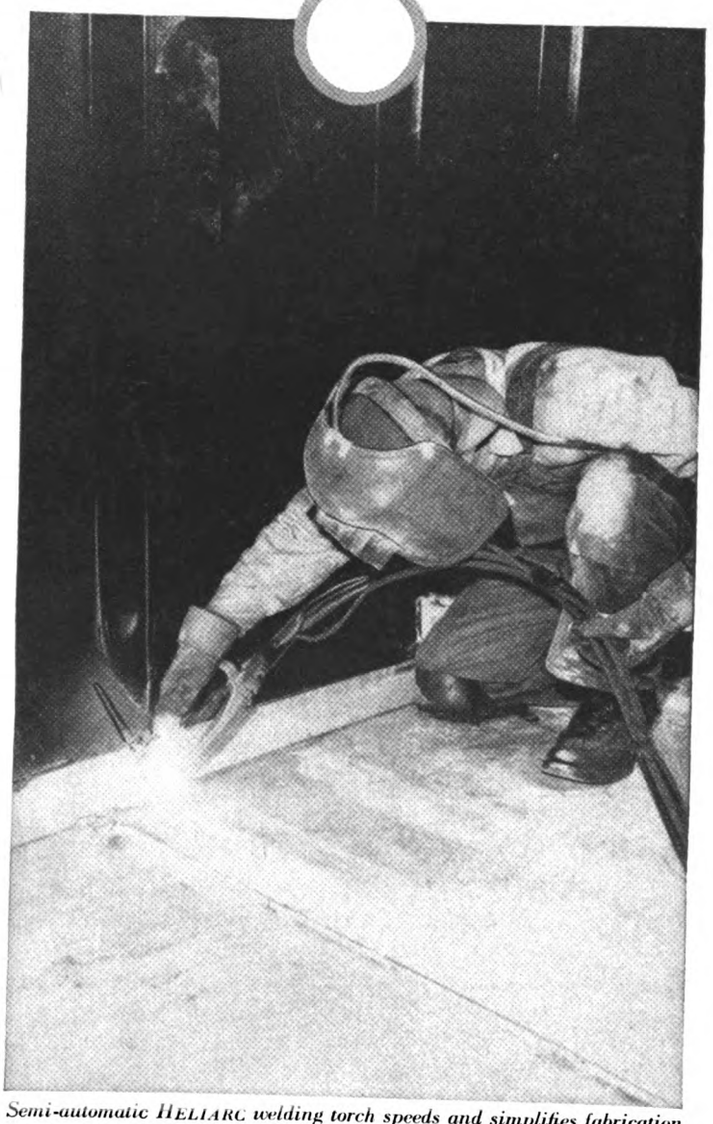
Welding Speeds Average 30 In. Per Minute

Semi-automatic welding requires no special skill, and speeds two to three times faster than manual welding can be easily maintained. The HELIARC welded side and floor panels shown are fabricated of 14 and 20 gage galvanized iron and mild steel.

309 Ft. Of Top-Quality Welds Per Car . . . Minus Flux

In HELIARC welding, argon gas automatically shields the weld puddle from contaminating effects of the atmosphere. All 31 butt, lap, and flange joints in each car are of the highest quality.

Find out about the particular welding installation that can increase your production speed and unit quality. Call your local LINDE representative for detailed information on LINDE's modern methods for joining metals.



Semi-automatic HELIARC welding torch speeds and simplifies fabrication of refrigerator cars.

RAILROAD DEPARTMENT

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

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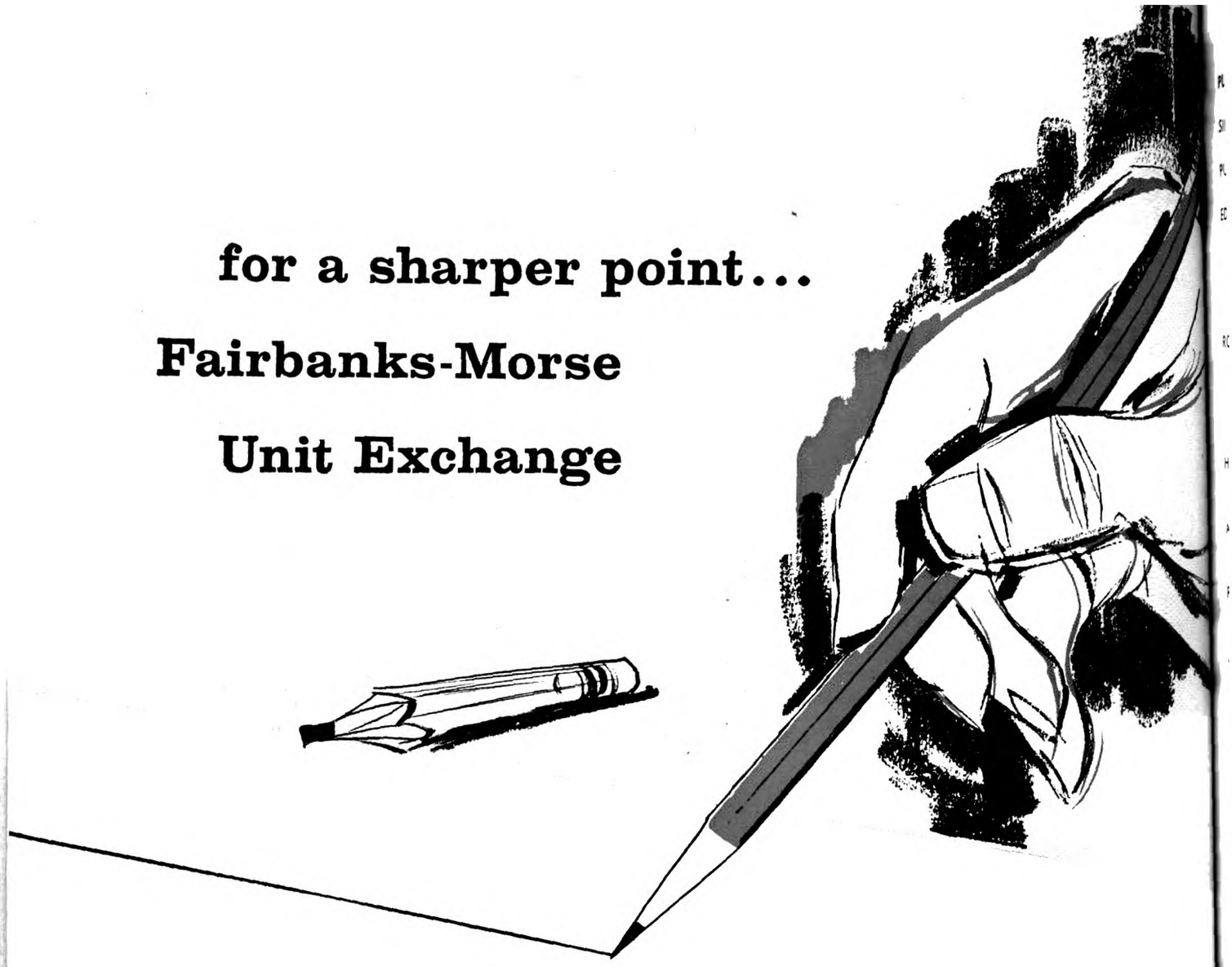
Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol - - -

for a sharper point...

Fairbanks-Morse

Unit Exchange



F-M Unit Exchange provides a way to meet increased tonnage demands on your motive power fleet—yet reduces your need for repair shop facilities . . . large parts inventory.

In minimum time you can upgrade your F-M power . . . exchange complete engines, blowers, pumps, F-M generators and traction motors. Your exchange equipment meets brand-new specifications and performance. And it carries the same warranty as new equipment.

Unit Exchange offers you the quickest way to return a locomotive to more profitable service at reduced maintenance. Fairbanks, Morse & Co., Dept. RLC-4, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS

PUBLISHED MONTHLY BY THE

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

APRIL, 1957 VOLUME 131, No. 4

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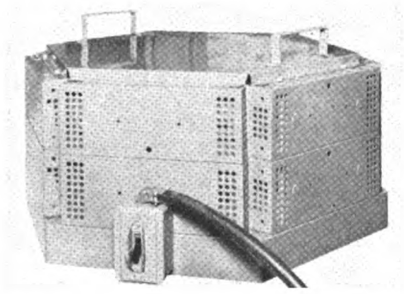
NEXT MONTH:

LV Power Plant
Color Schematics
Erie Wheel Shop



Pinion and Bearing Race Heater

A general purpose infra-red oven, designed to meet the increasing need for a portable and low cost source of radiant energy has just been made available. It is well adapted for most shrink fitting operations, including bearing races, pinions, couplings and other machine parts. A specific application of the new unit is the heating of diesel locomotive traction motor pinions to proper temperatures for shrink fitting on motor shafts.

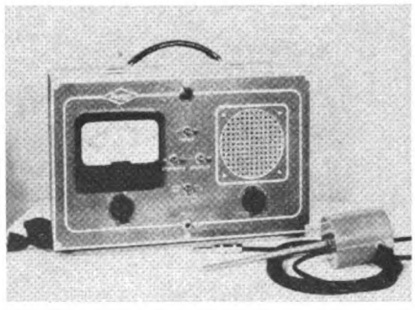
The oven is rated 6,000 watts and can be operated on 110-, 220- or 440-volt circuits. Fast acting with no warm-up period, it weighs 48 lb. complete, and can conveniently be carried by one man. The interior is Alzak-coated specular aluminum for high reflectivity and resistance to oxidation. A separate asbestos insulated base has four Marinite standoffs to insure radiation to the under surfaces of the product being heated. The radiant energy source is 12 General Electric 500-watt T-3 tubular quartz infra-red lamps having a life in excess of 5,000 hours at rated voltage. *Lighting Division, Safety Industries, Inc., Dept. RLC, Milford, Conn.*

Diesel Lube Oil

A new diesel lubricating oil for locomotives has been released after a 330,000-mile test. The lubricant, Gulf Dieselmotive 78, is formulated from base stocks with reported inherent film strength, lubricity, and excellent oxidation characteristics. The refiners say that the response of the special base stock to carefully prepared additives produces a diesel lubricant with outstanding oxidation resistance and reserve detergency for railway service.

This oil, under certain conditions, has actually increased the tonnage ratings on the locomotives. It was developed to enable engines to deliver full-rated horsepower under conditions of maximum output for extended periods under high ambient temperatures.

In the 330,000-mile test, two EMD 567-C units were employed on freight hauls where the ambient temperatures ranged from 0 to 110 deg. A detailed inspection of the engines was made after each of the two locomotive units had been run 165,825 mi. Rings and ring grooves, as well as intake ports, were clean. Deposits under the piston crowns were negligible. There were no heavy deposits or varnish anywhere in the engines. Bearing shells were found free of lacquer and put back in the engine for further service. There was no corrosive etching at the edge of silver plating adjacent to grooves of the wrist pin bushings. There was no evidence of scuffing on the silver plating, and the bushings were reinstalled for additional service. Wear of thrust washers was well below condemning limits. Hard carbon deposits were absent from exhaust valves and valve stems showed no significant lacquer or carbon deposits at the point of valve travel limit. *Gulf Oil Corporation, Dept. RLC, 1822 Gulf Building, Pittsburgh 30*

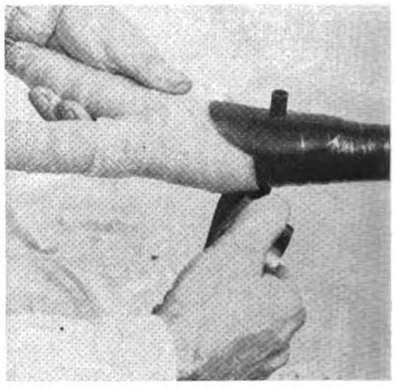


Electrified Screwdriver

The screwdriver used for listening to bearing noises has been electrified by connecting it with a compact electronic amplifier and producing a bearing tester. Resembling a portable radio in size and appearance, the instrument can be used in any shop for preventive and plant maintenance or quality control.

The tester detects and measures wear in bearings, gears, spindles or slides without disassembly of machinery. It enables plant maintenance engineers to keep machinery operating at established performance standards.

The instrument consists of a metal probe or pick-up, connected by an electric cord to a compact electronic amplifier equipped with calibrated meter, loudspeaker, controls and, if desired, with devices for making permanent records. Its power supply is any convenient electric outlet. *Sperry Products, Inc., Dept RLC, Danbury, Conn.*



Injection Type Cable Splices

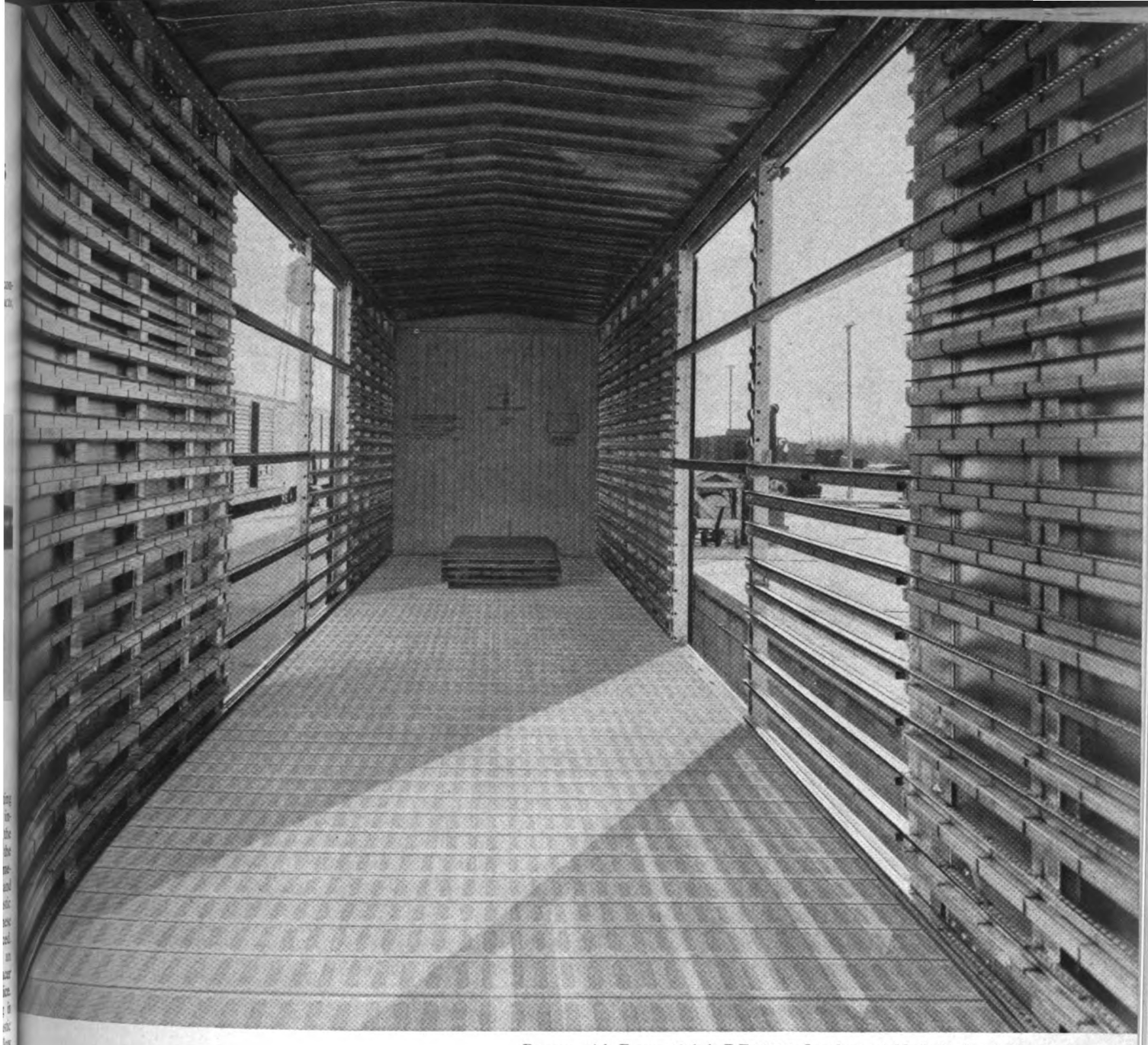
A method of protecting and insulating electrical splices with epoxy resin injected into a mold tailor-made in the field has been announced. Called the Scotchcast resin pressure splice, the method is applicable to both buried and aerial cable. Lead, rubber and plastic sheathed cable or combinations of these as well as shielded cable can be spliced.

The pressure splice method uses an open mesh screen-like tape as a spacer material, wrapped around the splice. This build-up of an open screening is covered with a liquid-impervious plastic tape holding an injection fitting to allow entry of the resin into the splice. The plastic tape in turn, is covered with a low stretch tape to restrict the expansion of the plastic envelope when resin is forced into the splice.

The adaptability of the method allows the mold to be tailor made for each splice, providing moisture-proof, void-free, high dielectric strength insulation around nearly any size or shape of splice. It is claimed to make possible uniform quality splices in less time than previous methods and to remove much of the factor of human error. The splices can be made by electricians without extensive special training or experience.

Resin for impregnating the splice is supplied in a plastic envelope which holds resin on one side of a dividing membrane and a hardener, or activator, on the other. When the divider is broken, the resin and activator are mixed by squeezing the ends of the container forming a resin which sets up or cures through internal heat. Spacer tape be-

(Continued on page 8)



Boxcar with Evans 19-belt DF (TM) Loader and Nailable Steel Flooring

N-S-F* helps

RAILROADS PROTECT INVESTMENT IN HIGH-REVENUE SPECIALLY EQUIPPED CARS

ABLE STEEL FLOORING is made of N-A-X HIGH- steel. Evans DF Loaders also use this ight, sturdy metal in major components.

Specially equipped high-revenue cars stay in service longer when provided with NAILABLE STEEL FLOORING. Down time for floor repairs is substantially reduced because N-S-F stands up under the heavy impact of lift truck loading. And N-S-F adds structural strength to critical points in the underframe.

Full information about N-S-F is readily available from Stran-Steel representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal.

*N-S-F (TM): NAILABLE STEEL FLOORING
Made and sold by
STRAN-STEEL CORPORATION
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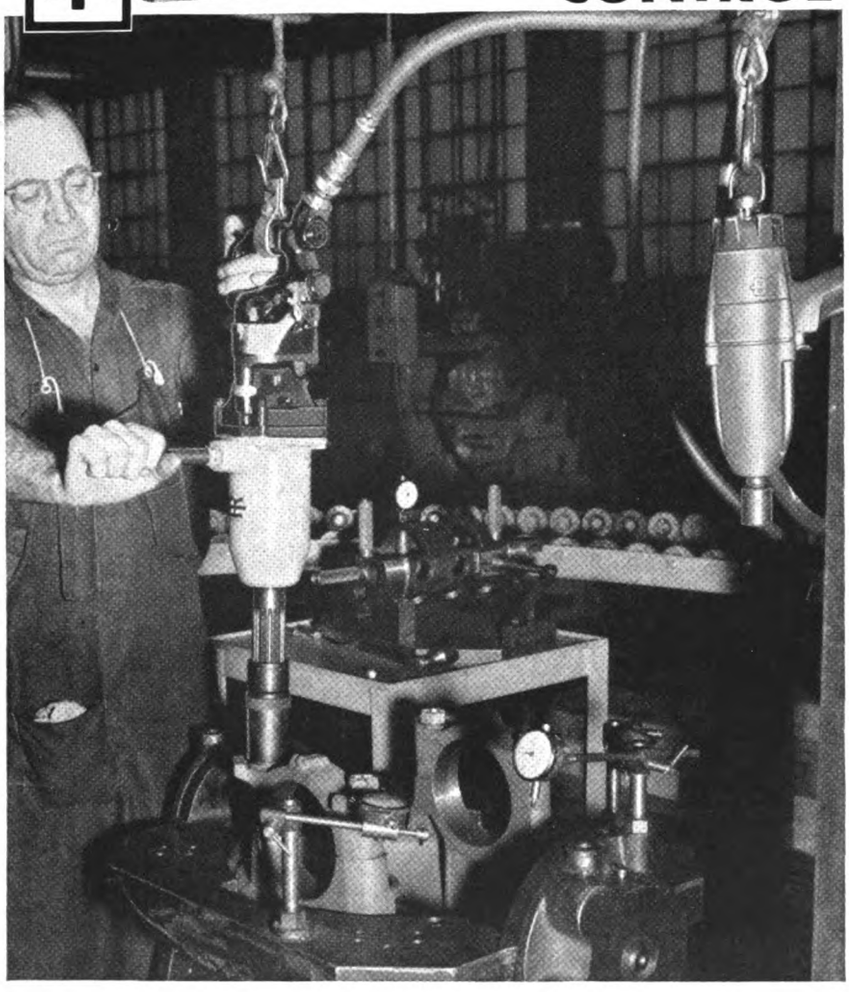
I-R TORSION BAR TORQUE CONTROL



TORQUE CONTROL IMPACTOOLS
consistently run nuts to prescribed torques

I-R Torsion-Bar Impactools now assure top quality control on these 3 operations:

1. *Assembling differential main bearing caps at 450 ft. lbs.* both before and after machining as shown above.
2. *Preloading differential drive pinion bearing* with Impactools set at 375 ft. lbs.
3. *Assembling wheels to wheel hubs at* 425 ft. lbs.

Quality control has risen to a new high for this large manufacturer of farm equipment since I-R Torsion-Bar Torque Control Impactools were installed.

These Impactools are the *only* power wrenches that deliver full power and speed until the preset torque is reached, and then instantly and automatically shut off.

Now, with Torque Control Impactools, the company consistently runs nuts to prescribed torques, saves time, improves quality and eliminates hand torque checking operations.

Write for Bulletin 5170 for proof of how these amazing Impactools can improve quality and cut costs on your own applications.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

8-524

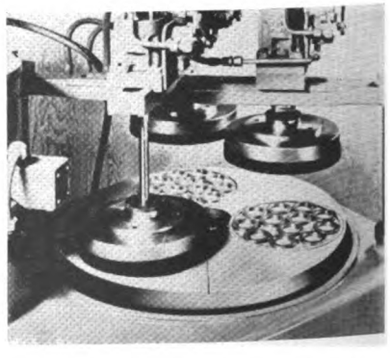
EQUIPMENT

(*Continued from page 6*)

tween the wire joint and an outer wrapping provides space into which the epoxy resin is forced through an injection fitting by means of a pressure gun. *Minnesota Mining & Manufacturing Co., Dept. RLC, St. Paul, Minn.*

Damage-Proof Electrical Connectors

A new line of compact, lightweight electrical connectors for military and industrial applications has been placed on the market. Known as the Pyle-Star-Line, these new plugs and receptacles are said by the maker to be impervious to water, moisture, oil, gas, dust, pressure, vibration and shock. The connectors meet and exceed performance requirements of class A, B, C, and E of military specifications MIL-C5015B as well as NEMA requirements for power, lighting, control and coaxial circuits. *Pyle-National Company, Dept. RLC, 1334 N. Kostner ave., Chicago 51.*



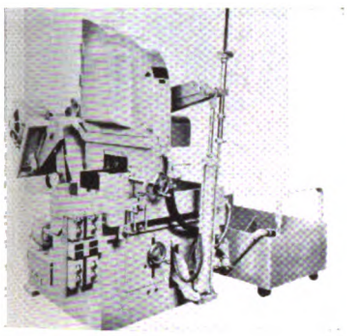
Polishing Equipment for 24-in. Lapping Machine

Polishing accessories and equipment are now available for converting the 24-in. lapping machine into a high-speed polishing unit.

The tooling consists of a special lap plate and pneumatic lifts. Sponge Neoprene pads are added to the pressure plates. There are 4/0 polishing paper discs and a double sided sensitive tape is used for mounting the polishing paper to the lap plate. Conversion can be readily accomplished in the plant.

The machine is especially suitable for parts requiring low RMS finishes, from 2 to 4, and flatness can generally be held under 3 light bands.

An alloy polishing plate is recommended to obtain closer finishes. *Crane Packing Co., Dept. RLC, 6400 Oakton st., Morton Grove, Ill.*



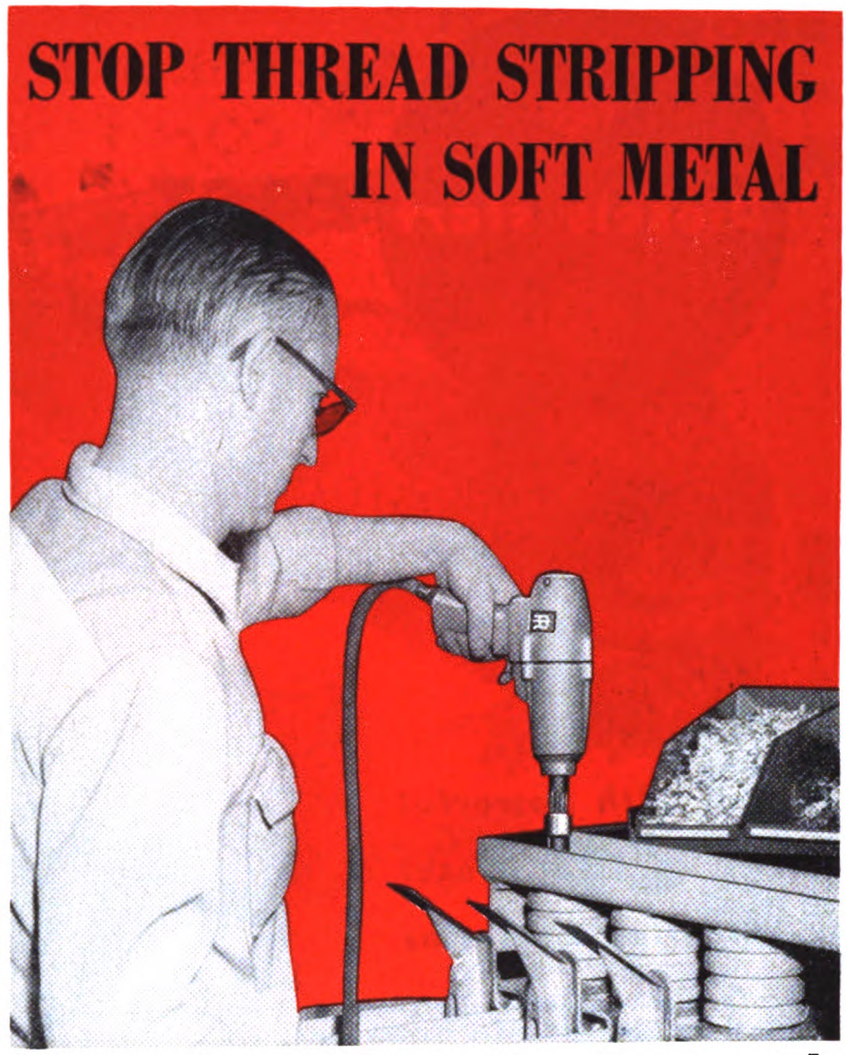
Wet Abrasive Cutting Machine

Model 481 wet abrasive cutting machine is designed to cut large diameter bar stock, tubing, and other shapes. Equipped with a 26-in. diameter Allison Abrasive cutting wheel, it will cut any conventional metal including corrosion resistant steel as well as many hardened or annealed types. This model is an oscillating type in which the wheel feed and work clamps are hydraulically operated and the work bar is hand fed. The oscillating motion was selected to reduce the amount of abrasive wheel contact; cutting is achieved with a reported minimum of wheel pressure.

The main bed is heavily ribbed, welded steel and includes a self-draining coolant collector. The forged alloy steel spindle is heat-treated, precision ground, dynamically balanced, and mounted in a separate housing, adjustable to accurate alignment. The spindle is mounted at the abrasive wheel and in a double row oversize ball bearing and at the opposite end in a double row self-aligning roller bearing. Both housing ends have labyrinth type seals to exclude dirt and moisture.

The motor bracket supports a separate motor pulley bracket equipped with outboard, self-aligning roller bearings. The motor is connected to the pulley unit with a coupling to relieve the belt load from the motor bearings. A turnbuckle type bracket provides belt tension adjustment regardless of the amount of load imposed by the cutting wheel.

The oscillating unit is driven by a constant speed, 1 hp geared head motor. In brief, the oscillator link mechanism causes the abrasive wheel to move back



here's how it's being done with Ingersoll-Rand TORQUE CONTROL impactools!

If you assemble soft metal threaded parts, such as aluminum or bronze, take a look at the improvement record made by this large electrical manufacturing company.

Parts spoilage is substantially reduced and product quality greatly improved since changing from conventional air powered wrenches to new Ingersoll-Rand Torque Control Impactools for running nuts and cap screws. These revolutionary Impactools shut off instantly and automatically when the preset torque is reached. No more stripped threads . . . and every fastener is precisely tightened for top quality.

Call or write for bulletin 5170, or ask for an obligation-free demonstration.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

8-523

with powerful C&D Diesel Starting Batteries

These powerful heavyweights—built for toughest railroad duty—pack the extra wallop it takes to crank those big diesels over *fast!* Full quarter-inch-thick positive plates (more grid metal than you'll find in any other heavy-duty battery) provide power-plus. Exclusive C&D *Slyver-Clad*® construction cuts down on wasted sediment space . . . uses the room for extra long plates.

C & D Diesel Starting Batteries mean:

1. High sustained voltage during cranking
2. Reduced maintenance requirements
3. Reduced connection loss

FOR COMPLETE DETAILS WRITE FOR BULLETIN DL-576.

PASSENGERS STAY COMFORTABLE with C&D Car Lighting and Air Conditioning Batteries

C & D MEANS:

1. Lowest annual cost
2. Sustained high voltage for maximum time
3. Reduced connection loss

For complete details, write for Bulletin AC-546.

C&D BATTERIES, INC. of Conshohocken, Pa.

INDUSTRIAL BATTERIES SINCE 1906

50th ANNIVERSARY

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

and forth across the work piece, as it is fed hydraulically through the work piece.

For safety, the wheel guard is fixed to the bed and encloses the wheel except for work entry openings. The abrasive wheel is accessible through a hinged door and coolant splash guards are included for the full range of material sizes.

The coolant system originates in a wheel mounted, separate tank. This was was done to permit easy removal for chip cleaning. Compartments settle out the sludge to keep the coolant clean. From here it is pumped to an adjustable coolant box with baffle plates between which the abrasive wheel rotates. This is to assure equal wetting of both sides of the abrasive wheel, as well as bringing the coolant directly to the cutting area.

Model 481 has a 25 hp, 1,800 rpm, totally enclosed, fan-cooled motor to drive the abrasive wheel. The spindle is driven through multiple V-belts. The controls are painted red for ease of operation and all interior parts are cadmium plated to prevent rust. This cutting machine is 100 in. long, 85 in. wide, and 84 in. high. Its weight, with the electrical equipment, is approximately 6,800 lb. *American Chain & Cable Co., Dept RLC, 929 Connecticut Ave., Bridgeport 2, Conn.*

24-in. Lapping Machine With Dual Agitator Tank

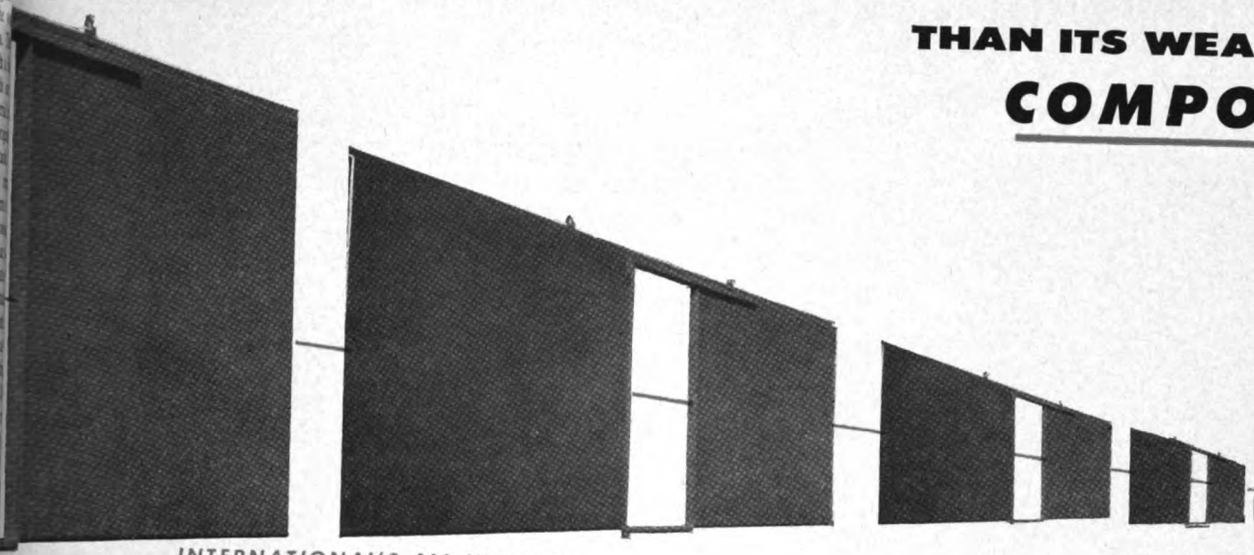
A new dual agitator tank attachment now permits coarse and fine lapping on the 24-in. lapping machine. Coarse abrasive is used in one tank and fine abrasive in the other.

Where lapping tolerances are not critical, it is unnecessary to change laps and conditioning rings when switching from one tank to another; only the lap plate needs cleaning. Roughing to finishing and back to roughing can be done in one continuous operation. A single set of conditioning rings and one lap plate makes a complete installation.

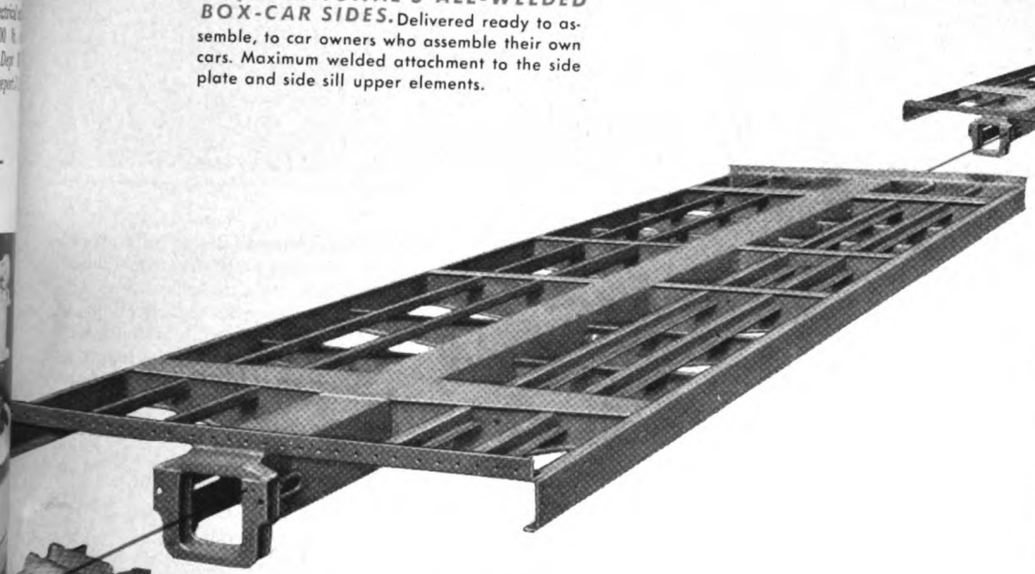
Where fine lapping is required, a second

(Continued on page 84)

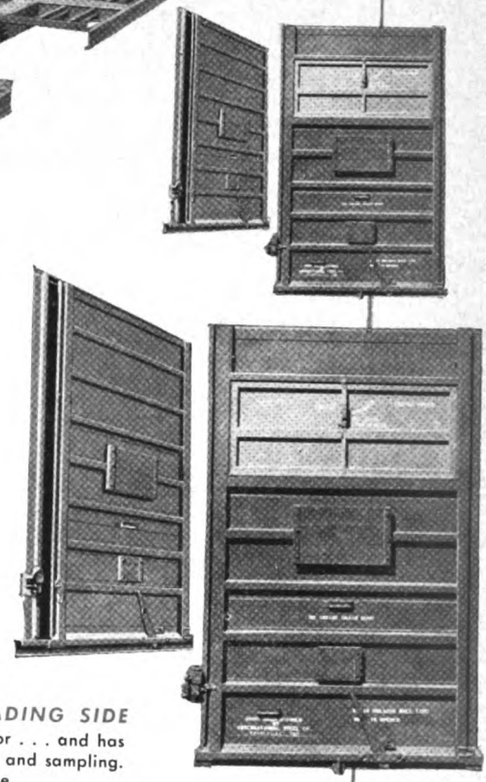
A FREIGHT CAR IS NO STRONGER THAN ITS WEAKEST COMPONENT.



INTERNATIONAL'S ALL-WELDED BOX-CAR SIDES. Delivered ready to assemble, to car owners who assemble their own cars. Maximum welded attachment to the side plate and side sill upper elements.

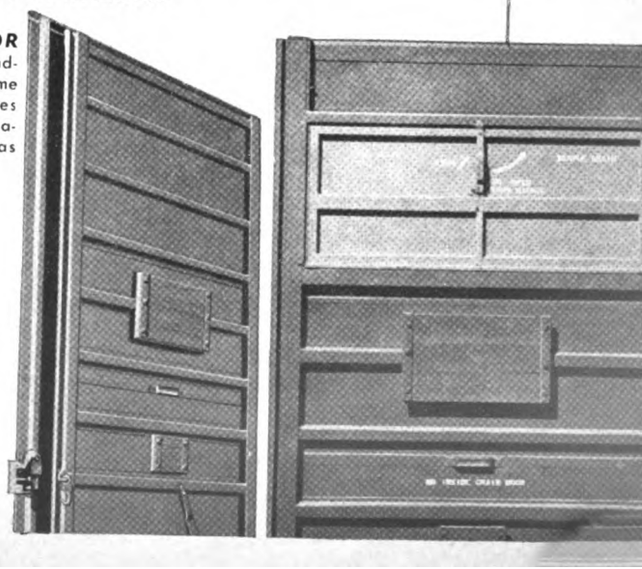


INTERNATIONAL'S CENTER FILLER, REAR DRAFT LUGS, CENTER PLATE, one steel casting welded integrally into the bolster-center sill connections . . . International's corrective design for an all-welded underframe which has a history of NO FAILURES!



INTERNATIONAL'S BULK-LADING SIDE DOOR. Requires no inside grain door . . . and has an access door for loading, inspection and sampling. Positive retainment on the car structure.

The ***UTILITY DOOR*** without the grain loading feature has the same inter-locking features and sturdier International construction as the Bulk-lading door.



INTERNATIONAL STEEL COMPANY

RAILWAY DIVISION
EVANSVILLE 7, IND.

Precision fabricators of correctively designed components

J. D. Ristine

Ristine Becomes Executive Secretary ARSA

John D. Ristine has been elected executive secretary of the Allied Railway Supply Association and secretary of the Committee of the Coordinated Associations, with offices at 80 East Jackson Blvd., Chicago 4. Mr. Ristine, who succeeds R. E. Coughlan, resigned, will continue to represent the Frost Paint & Oil Corp. of Minneapolis in Chicago.

Electronic Hot-Box Detector Installed on Reading

An infrared ray system to detect hot boxes has been installed on the New York branch of the Reading. Use by the railroad of thermal relays for experimental remote-control operation of a diesel locomotive to combat motor freezing also has been announced. "Application of infrared rays to numerous railroad operating problems has tremendous future possibilities," according to E. Paul Gangewere, Reading vice-president, operation and maintenance.

The hot-box detector consists of an infrared camera, the lens of which records the temperature of each passing journal. A thermal relay operates to indicate any overheated journal at either next signal or first control tower ahead.

Cast-Steel-Wheel Tests To Continue

Despite approval, as an AAR standard, of the one-wear cast steel wheels on March 1 for freight-car service, both of the large producers of these wheels, Griffin and the Southern Wheel Division of American Brake Shoe Company, will continue obtaining data on test wheels now in service. A high percentage of the initial application of these wheels are still rolling up mileage.

In the item on page 14 of the March issue entitled "AAR Approves Cast Steel Wheel," the AAR quarterly report of mileage to date is shown for both companies. The figures given are actually the average, accumulated mileages. From the additional data to be obtained, both companies expect far greater mileages will be reflected before completion of tests.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
December, 1952	2,869,929	1,742	3,632	5,374	534,040
December, 1953	2,656,063	1,581	2,550	4,131	642,958
December, 1954	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425

Miscellaneous Publications

ASTM STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS. Compilation includes 180 standards, 48 of which are new or revised, on methods of tests, specifications, definitions of terms and classifications of petroleum products and lubricants with related information, including report of ASTM Committee D-2 on Petroleum Products and Lubricants, and proposed methods of test. *American Society for Testing Material, 1916 Race st., Philadelphia 3. Price: cloth cover, $7.50; paper cover, $6.75.*

Personal Mention

Baltimore & Ohio

W. H. BETTCHER, general car foreman at Indianapolis, retired.

Canadian National

W. H. WOODHOUSE appointed road foreman of engines, Hornepayne division, Hornepayne, Ont.

S. A. MCLEOD appointed road foreman of engines, Capreol division, Capreol, Ont.

W. W. ALWAY, car foreman at Stratford, Ont., appointed car foreman at Sarnia.

Chesapeake & Ohio

C. J. TOLLOFF has been appointed district car foreman at Saginaw, Mich.

W. V. MOSELEY appointed assistant to superintendent motive power at Richmond, Va.

J. E. FOSTER, assistant to superintendent motive power at Richmond, Va., retired.

H. F. SHANNON appointed assistant district general car foreman in Milwaukee Terminals. Headquarters Davies Yard.

Denver & Rio Grande Western

Denver, Colo.

O. D. BENSON appointed mechanical engineer at Denver, Colo.

J. P. SPIESS appointed shop engineer.

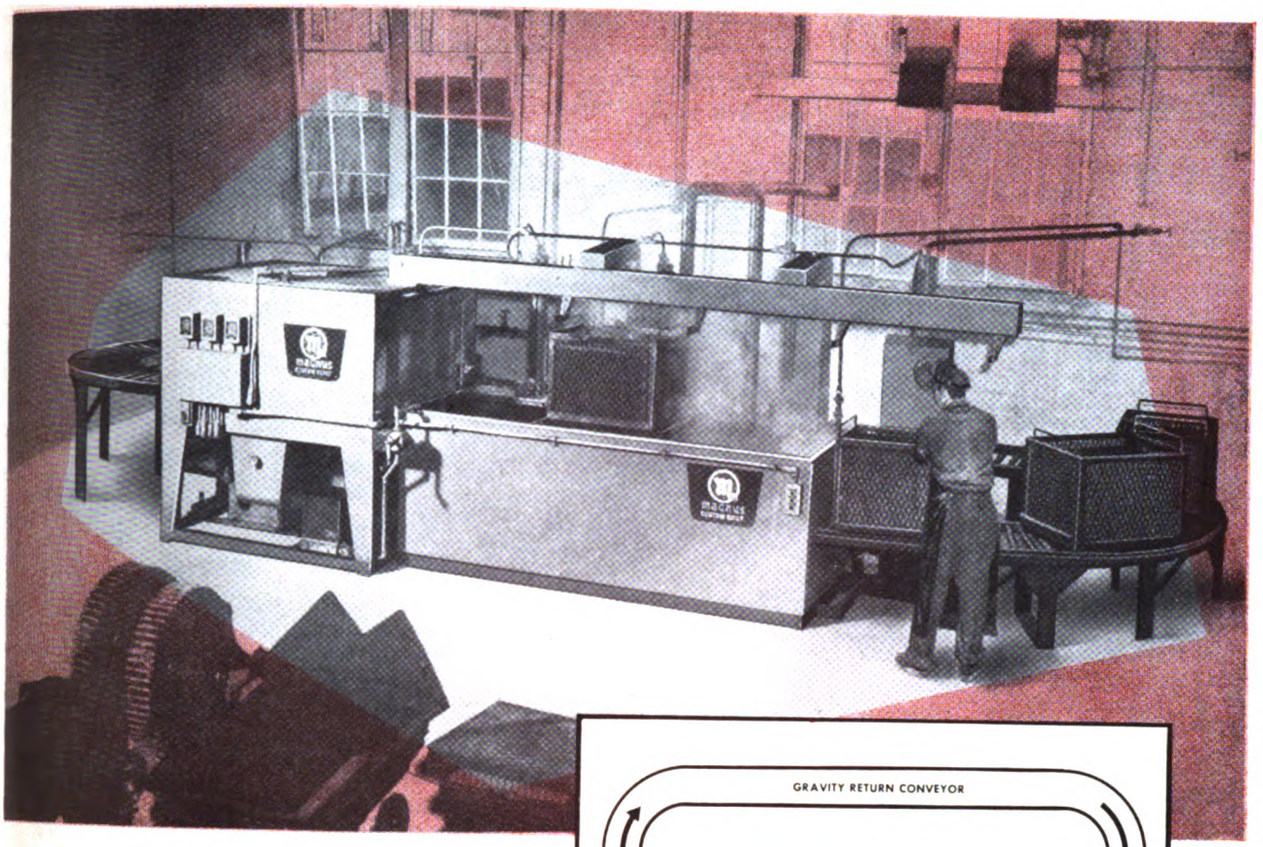
Erie

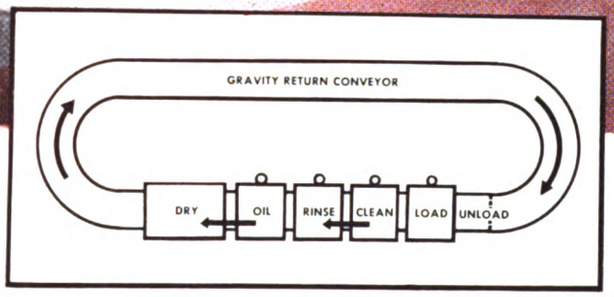
ROBERT E. CURTIS appointed division car foreman at Port Jervis, N. Y.

Minneapolis & St. Louis

W. J. WEATHERALL appointed superintendent car department, Minneapolis. Formerly sales engineer, Pacific Car & Foundry Co.

(*Continued on page 14*)





Completely automatic filter-cleaning installation at Elizabethport, N. J. diesel shop of Jersey Central.

JERSEY CENTRAL NOW CLEANS 3 TIMES MORE DIESEL FILTERS!

AUTOMATICALLY! CLEANER! FASTER!

Completely automatic — from the moment that dirty filters are loaded in the baskets—until they are removed—ready to use—this *one* new Magnus Automatic Filter Dip machine *cleans, rinses, oils,* and *dries* diesel filters . . . not singly, but in *batches* . . . up to 96 per hour . . . without any further manual handling. Jersey Central reports that one operator is now able to clean 3 times as many filters as previously, *yet with more free time for other jobs.* Moreover, they report that the filters are *cleaner than ever* before . . . far cleaner than when the previous time-consuming, expensive method was used.

For full information on this new Magnus machine—or on other Magnus cleaning machines, materials and methods—write Magnus, 77 South Ave., Garwood, New Jersey.

magnus

RAILROAD DIVISION

MAGNUS CHEMICAL CO., INC.

a world-wide organization specializing in cleaning and protection of all surfaces.

PERSONAL MENTION

(*Continued from page 12*)

New York Central

JOHN J. KEATING, assistant master mechanic, locomotive department, Collinwood, Ohio, appointed master mechanic, locomotive department, Toledo.

VAUGHN E. SCOTT appointed master mechanic, locomotive department, Columbus, Ohio.

F. F. DUBAY appointed superintendent of shop at W. Detroit.

M. M. O'NEILL appointed lubrication engineer at New York.

F. J. MURRAY appointed assistant engineer—steam heat, at New York.

TECHNICAL RESEARCH DEPARTMENT

Collinwood, Ohio

Manager, material inspection: A. T. GREEN

Supervisor, material inspector: H. C. RIDER

Chief chemist: H. WOCHELE

Microscopist: G. J. FRANK

Spectrographer: W. C. HARSH

Supervisor, material tests: W. S. GORDON

Supervisor, Mechanical Laboratory: W. E. LENTZ

Mechanical Laboratory assistant: H. D. GLASS

New York, New Haven & Hartford

New Haven

ROBERT W. HOOPER, acting general mechanical superintendent, appointed chief mechanical officer.

RUSSELL H. DAVIS, assistant chief mechanical officer, appointed assistant general mechanical superintendent.

GEORGE A. CLARKE, mechanical engineer, appointed assistant general mechanical superintendent.

RALPH B. HART, assistant to chief mechanical officer, appointed assistant to general mechanical superintendent.

WILSON E. SYMONS, general master mechanic, appointed mechanical engineer.

DONALD S. ONNEN, assistant chief mechanical officer, appointed chief engineer of equipment.

WILLIAM A. BAKER, assistant chief mechanical officer, appointed general superintendent of locomotive maintenance.

WILLARD B. CROWLEY, assistant mechanical engineer, appointed electrical engineer.

HERBERT C. SCOVILL, resident equipment engineer, appointed assistant electrical engineer.

Pennsylvania

W. J. MADDEN, assistant electrical engineer, retired.

Southern

Alexandria, Va.

HARRY B. DUNDON, JR., appointed general foreman.

Atlanta, Ga.

THOMAS S. HOOPER appointed general foreman.

CLAUDE O. GARVIN appointed general foreman. Formerly general foreman at Columbia,

PRINCE B. ELEAZER, JR., appointed general foreman.

Charlotte, N. C.

WILLIAM M. GADDY appointed general foreman.

WILLIAM M. ALMON appointed general foreman.

WILBUR D. SHUTS, master mechanic at Macon, Ga., appointed master mechanic at Alexandria, Va.

ARCHIE G. WALDRUPE, assistant master mechanic at Atlanta, Ga., appointed master mechanic at Macon, Ga.

CLARENCE A. FRICK, master mechanic at Columbia, S. C., appointed master mechanic at Birmingham, Ala.

HARRY B. ROSENSTEIN, master mechanic at Chattanooga, Tenn., appointed master mechanic at Columbus, S. C.

OLIVER H. SMART, assistant master mechanic at Spencer, N. C., appointed master mechanic at Chattanooga, Tenn.

MANLEY H. HAMMETT, master mechanic at Birmingham, Ala., appointed master mechanic at Spencer, N. C.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MARCH ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and Builder	*No. of Units*	*Horse-power*	*Service*	*Other Detail*
COLORADO & WYOMING:				
Electro-Motive	1	900	Switching	———
LACKAWANNA:				
Electro-Motive	8	1,200	Yard switch.	Approx. cost, $1,000,000. For delivery in fall.

GAS-TURBINE ELECTRIC LOCOMOTIVE ORDERS

UNION PACIFIC:				
General Electric	15	8,500	Freight	In addition to 15 such units ordered late in 1955. Approx. cost, $15,000,000. Delivery expected to begin early in 1958.

FREIGHT-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Cap., Tons*	*Other Detail*
BANGOR & AROOSTOOK:				
ACF Industries	400	Box	50	50-ft. Approx. cost, $3,750,000. Fifty to be equipped with roller bearings and Nailable Steel flooring.
BURLINGTON:				
Company shops	1,525	Box	50	25 for C&S.
	410	Covered hopper	70	60 for C&S.
	50	Gondola	70	985 cars for delivery next year.
ERIE:				
Greenville Steel Car	100	Covered hopper	70	Cost, $1,125,000. For July delivery.
GULF, MOBILE & OHIO:				
Bethlehem Steel	50	Mill-type gondola	70	For January 1958 delivery.
ACF Industries	10	Tank	—	19,000 gal. For August delivery.
NORFOLK SOUTHERN:				
Bethlehem Steel	25	Hopper	50	In addition to previous order for fifty 50-ton hoppers. Cost, $172,500. Delivery expected this month.
NORTH AMERICAN CAR:				
Pullman-Standard	200	Covered hopper	70	Estimated unit cost of these 275 cars,
ACF Industries	75	Covered hopper	70	$11,000. For delivery Sept.-Nov.
PHILADELPHIA, BETHLEHEM & NEW ENGLAND:				
Bethlehem Steel	30	Gondola	70	Estimated cost, $275,000. Delivery late 1957 or early 1958.
TEXAS & PACIFIC:				
Company shops	75	Box	50	230 cars for construction next year.
	25	Refrigerator	50	
	100	Gondola	70	
	30	Covered hopper	70	
UNION PACIFIC:				
Bethlehem Steel	500	Gondola	70	———
UNION TANK CAR CO.:				
Company shops	800	Tank	—	11,000-gal.
	56	Tank	—	10,600-gal. For delivery this year and
	1	Tank	—	6,000-gal. next year.
	11	Tank	—	4,000-gal.
WABASH:				
Pullman-Standard	4	Covered hopper	70	Immediate delivery.
WILSON CAR LINES:				
Pacific Car & Fdry.	200	Refrigerator	40	Estimated cost, $2,645,000. For fourth quarter delivery.

PASSENGER-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Other Detail*
BURLINGTON:			
Budd Co.	10	Gallery	Air conditioned. Similar to 50 units already in service. For delivery third quarter 1957. Seats for 145.
NORTHERN PACIFIC:			
Budd Co.	6	Dining	Eight cars for "North Coast Limited."
	2	Vista Dome coaches	
SANTA FE:			
Budd Co.	15	Baggage	For January 1958 delivery.

INQUIRIES AND NOTES

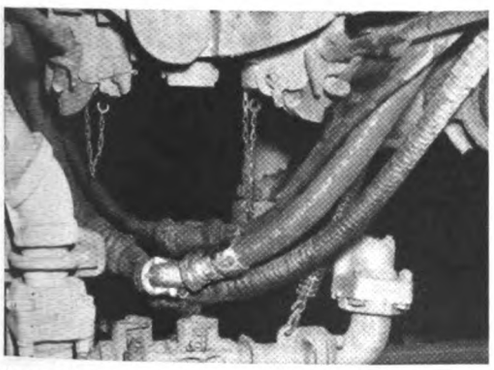
FREIGHT CARS:

Chesapeake & Ohio.—Ordered 100 car sets of box-car doors with aluminum bottom panel from Youngstown Steel Door.

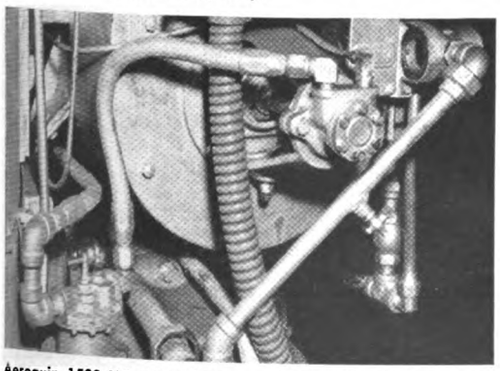
Cotton Belt.—Budgeted $1,440,350 to buy 100 additional hopper cars and 50 pulpwood rack cars for delivery this year.

Rock Island.—Ordered from ACF Industries 10 aluminum refrigerator cargo units for Convert-A-Frate service. Delivered in March.

Northern Pacific diesel-powered locomotives like this use Aeroquip Flexible Hose Lines to minimize downtime and reduce maintenance costs.



A typical Aeroquip Air Brake Hose installation, using 1531 Hose and Reusable Fittings. Replacement lines like these can be assembled and installed quickly.



Aeroquip 1503 Wire Braid Hose and Reusable Fittings make up water and fuel lines on this steam generator.

Northern Pacific Railway Uses Aeroquip Hose Lines

FOR AIR BRAKE, WATER, FUEL AND OIL APPLICATIONS

On-schedule railroad operations call for dependable performance of equipment. Railroads like Northern Pacific minimize downtime and cut maintenance costs by using Aeroquip Flexible Hose Lines for air brake, water, fuel and oil lines.

For example, damaged air brake lines on locomotives and passenger cars are replaced quickly with Aeroquip 1531 Air Brake Hose and Reusable Fittings. Hose lines are made up when needed, in the shop, by cutting bulk hose to length and attaching the Aeroquip Fittings. Bulk hose and reusable fittings reduce inventory, save money.

Get full information on Aeroquip products from the Aeroquip Distributor listed in your Yellow Page Directory. Call him.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Supply Trade Notes

AMERICAN STEEL FOUNDRIES.—*Carl E. Tack*, assistant vice-president of the transportation equipment division, has been appointed chief mechanical engineer of this division.

■

MAGNUS METAL CORPORATION.—*M. A. Hanson* has been appointed chief engineer at Chicago, succeeding *Lawrence L. Neebe*, retired. He was previously engineer of research on the Gulf, Mobile & Ohio. Mr. Hanson began his career in 1928 as assistant chemical engineer on the Alton, which was later consolidated with the GM&O. He was appointed assistant engineer of tests in 1945 and engineer of research in 1948. He is vice-chairman of the AAR Committee on Lubrication of Cars and Locomotives and a registered professional engineer in the State of Illinois.

■

THOR POWER TOOL COMPANY. — *William J. Laughlin*, Los Angeles branch manager, has been appointed industrial division manager at Chicago. *Clarence H. Gabriel*, Denver manager, succeeds Mr. Laughlin at Los Angeles. *Mark A. Sorenson*, Philadelphia manager, succeeds Mr. Gabriel at Denver; *John L. MacDonald*, Newark manager, succeeds Mr. Sorenson at Philadelphia, and *Albert C. Cheswick*, Houston service engineer, succeeds Mr. MacDonald as manager in Newark.

■

HUCK MANUFACTURING COMPANY.—A west coast branch for warehousing and service of blind rivet and lock-bolt type fasteners and related tools has been opened in suburban Englewood, Los Angeles, Cal. *R. A. Villacres* has been named branch manager there.

■

CANADIAN STEEL FOUNDRIES.—An annual production of 1,000,000 wheels is the goal set for the $6,000,000 plant under construction in Montreal for the production of wrought-steel wheels for railroad cars and locomotives. The plant is expected to go into operation late in 1958 or early in 1959.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of December		12 months ended with December	
		1956	1955	1956	1955
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	3,199	5,398	46,268	65,892
3—06	Total, Diesel-electric	37,261	37,206	446,683	427,601
3—07	Total, electric	694	700	8,690	8,966
3—04	Total, locomotive-miles	41,420	43,547	504,680	505,128
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1,633	1,663	20,237	20,099
4—06	Empty, total	987	972	11,343	11,054
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	8,376	12,159	115,652	151,724
6—02	Total in oil-burning steam locomotive trains	614	1,822	14,526	26,254
6—03	Total in Diesel-electric locomotive trains	107,546	102,837	1,290,337	1,209,703
6—04	Total in electric locomotive trains	2,130	2,025	27,021	27,086
6—06	Total in all trains	119,605	119,652	1,458,204	1,423,551
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.02	1.03	1.02
10—02	Loaded freight car-miles	42.3	42.1	43.0	42.7
10—03	Empty freight car-miles	25.5	24.0	24.1	23.5
10—04	Total freight car-miles (excluding caboose)	67.8	65.0	67.1	66.2
10—05	Gross ton-miles (excluding locomotive and tender)	3,094	2,951	3,100	3,026
10—06	Net ton-miles	1,400	1,323	1,420	1,374
12	Net ton-miles per loaded car-mile (M-211)	33.1	32.3	33.0	32.1
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	62.3	63.1	64.1	64.5
14	Averages per train hour (M-211):				
14—01	Train miles	19.1	18.6	18.6	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	58,300	54,822	57,012	55,770
14	Car-miles per freight car day (M-240):				
14—01	Serviceable	45.8	46.1	46.8	46.9
14—02	All	44.2	44.3	45.0	44.5
15	Average net ton-miles per freight car-day (M-240)	913	902	953	922
17	Per cent of home cars of total freight cars on the line (M-240)	43.8	41.7	41.8	44.9

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—05	Steam	537	1,379	8,394	16,503
3—06	Diesel-electric	21,010	21,461	243,142	243,516
3—07	Electric	1,323	1,399	14,969	15,672
3—04	Total	22,874	24,240	266,510	275,698
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	247,098	259,332	2,766,315	2,832,589
4—09	Total in coal-burning steam locomotive trains	3,670	8,814	52,747	95,680
4—10	Total in oil-burning steam locomotive trains	1,213	3,884	15,973	48,464
4—11	Total in Diesel-electric locomotive trains	225,917	230,159	2,517,888	2,507,416
12	Total car-miles per train-mile	10.36	10.33	9.93	9.87

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	197,121	292,516	2,744,966	3,469,679
1—01	Steam, oilburning	17,379	41,090	348,251	577,982
1—03	Diesel-electric[1]	3,876,473	3,905,163	45,819,549	44,201,396
1—06	Total	4,093,962	4,242,619	48,955,993	48,321,569
2	Passenger yard switching hours:				
2—01	Steam, coal-burning	4,875	7,981	67,011	99,621
2—02	Steam, oil-burning	2,233	4,600	37,437	62,822
2—03	Diesel-electric[1]	268,341	270,696	2,982,564	2,947,845
2—06	Total	302,492	311,376	3,385,832	3,422,356
3	Hours per yard locomotive-day:				
3—01	Steam	6.5	6.4	6.4	5.9
3—02	Diesel-electric	15.6	16.2	15.7	15.7
3—05	Serviceable	15.6	15.9	15.7	15.5
3—06	All locomotives (serviceable, unserviceable and stored)	14.5	14.4	14.4	13.8
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.72	1.76	1.68	1.67
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.75	.74	.75	.75

[1] Excludes B and trailing A units.

C. E. Tack

M. A. Hanson

W. J. Laughlin

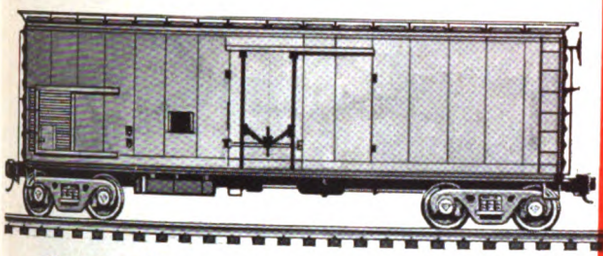
R. A. Villacres

38 LEADING LINES NOW HAVE IN SERVICE OR ON ORDER

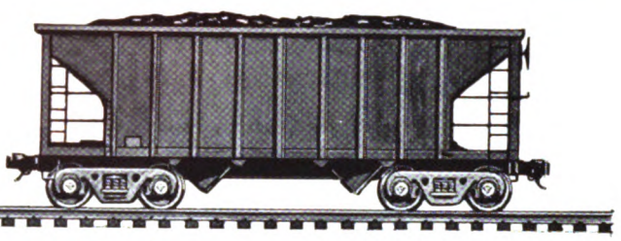
9313*

CARS WITH DEPENDABLE

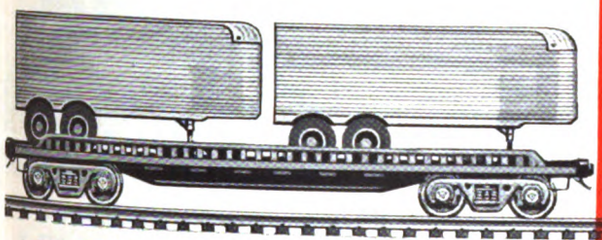
HYATTS ...including:



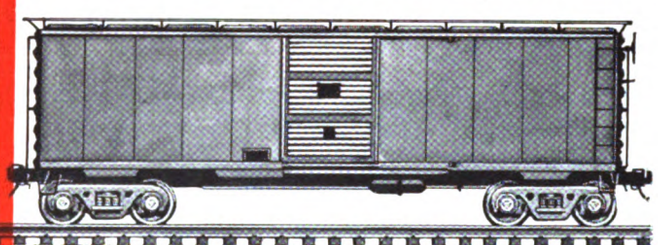
2385* refrigerator cars



1929* ore cars and covered hoppers



728* T.O.F.C. cars



1304* box cars

*latest available figures at press time

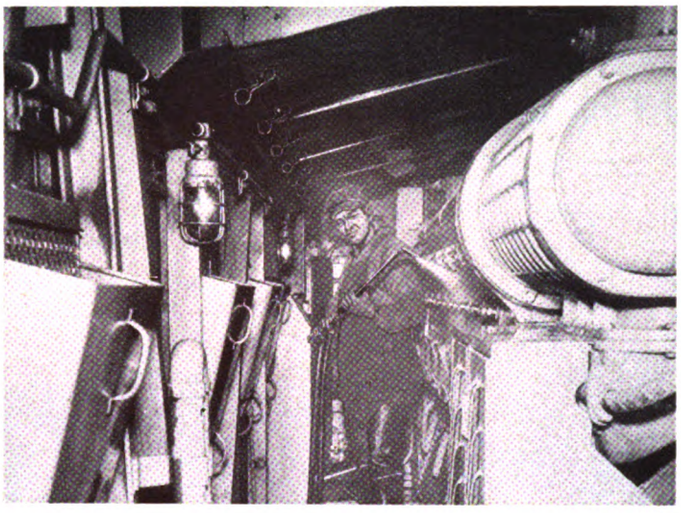
Watch "WIDE WIDE WORLD"
Sundays on NBC-TV

Already more than *100 million freight car-miles* have proved the dependability of HYATT'S long-lived straight cylindrical roller design. No wonder more and more railroads are switching to HYATT Hy-Rolls! They have fewer parts than other roller bearings. They need no fitting adjustments, and can be *completely* dismantled for inspection. Races are forged of finest high-nickel steel for longer wear. Hy-Rolls take only ten ounces of grease every three years. Low-cost, *low-upkeep* HYATT Hy-Rolls are your best buy for the long haul! Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

Another GM GENERAL MOTORS contribution to railroad prosperity

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

In DIESEL CLEANING, too



Oakite gives you

low-cost end results

RESULTS TALK! So if you're after genuine savings in diesel cleaning check the *results* Oakite delivers.

Take for example, the cleaning of diesel interiors. One Class 1 Road had been using an alleged "low-cost-per-pound" material for this critical job. Then they tried Oakite Composition No. 72—costing peanuts more per pound. Here are the *end results:*

In one month—washing 300 diesels—Road cut their cleaner poundage from 1200 lbs. to 337 lbs. They cut their monthly cleaner cost from $144.00 to $57.63. And they got better cleaning, better rinsing.

Another Road, using this same Oakite 72 for washing diesel exteriors, saves over $800.00 a month. They use 5.6 gallons at 2 oz/gal. as against 20 gallons at 6 oz/gal. per diesel. These figures speak for themselves. Results tell the true story.

Booklet F-8055 describes the many specialized Oakite materials and methods that guarantee economical railroad maintenance cleaning. Send for your copy to Oakite Products, Inc., 46 Rector Street, New York 6, New York.

OAKITE

SCIENCE

gives you the important advantage . . .

LOW-COST END RESULTS

Export Division
Cable Address: Oakite

RAILROAD DIVISION

SUPPLY TRADE NOTES

(*Continued from page 16*)

AMP INCORPORATED.—Two new regional offices have been established at Wayne, Pa., and at Dallas, Tex., in charge of *Robert V. Tate* and *James E. Miller*, respectively. Mr. Tate was previously district sales engineer; Mr. Miller, district sales engineer at Rochester, N. Y.

■

GOULD - NATIONAL BATTERIES, INC.—*George R. Powers, Jr.*, has been appointed St. Louis regional manager of the Industrial Division.

■

AIR REDUCTION SALES COMPANY.—*H. C. Wallace*, district manager at Louisville, Ky., has been appointed assistant regional sales manager, Southern region, with headquarters in Louisville. *A. C. Pease*, assistant sales manager, succeeds Mr. Wallace as district manager.

■

O. Bergman

WESTINGHOUSE AIR BRAKE COMPANY.—*Oscar Bergman* has been appointed southeastern district engineer, with headquarters in Washington, D. C. *W. V. Steele* succeeds Mr. Bergman as representative in the southeastern district.

■

LINDE AIR PRODUCTS COMPANY. —*H. T. Ross* has been appointed vice-president-engineering.

■

MILLER LUBRICATOR COMPANY. —*Harry Lock* has been appointed a sales representative, with headquarters at 3908 Scadlock Lane, Sherman Oaks, Los Angeles, Calif.

■

GENERAL AMERICAN TRANSPORTATION COMPANY. — *Stuart H. Moyes*, supervisor of engineering department, car maintenance division, has been appointed chief engineer of the freightcar designing division, succeeding Fred Garlock, retired.

Obituary

CHARLES E. BASCOM, president and chairman of the board of the Broderick & Bascom Rope Co., died on December 27.

Being interviewed is H. A. Fuggiti, Acting Senior Development Engineer

"Here's where the heavy slugs of power come from"

At the Exide Laboratories — **Reporter:** Just exactly what part of the battery is that, Mr. Fuggiti?

Fuggiti: This is the Exide-Ironclad positive plate. And in any battery, power reserve is governed by positive plate area.

Reporter: Then do you mean that Exide-Ironclad Batteries have *more* positive plate area?

Fuggiti: Exactly. You can see that here. The cylindrical power tubes are arranged in a row. So the semicircular sides give an effective plate area one-third more than the plate size.

Reporter: How does that increase power reserve?

Fuggiti: Because there's a bigger working surface of battery plate exposed to the electrolyte. Power response is faster.

Reporter: What does this mean in battery performance?

Fuggiti: It means the battery can provide power to spare for peak power loads as well as a dependable source for continuous loads.

Reporter: Obviously this is an important feature of the Exide-Ironclad Batteries.

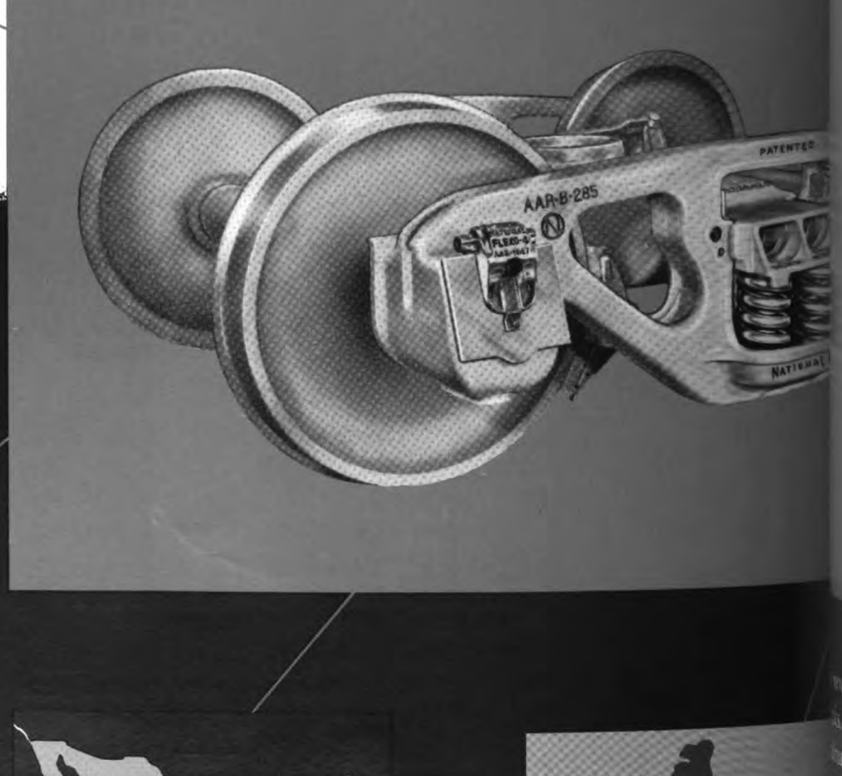
Fuggiti: Yes it is, but it's just one of many engineering details that contribute to their long life and high capacity.

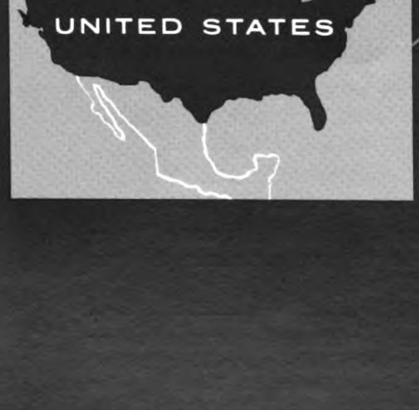
Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

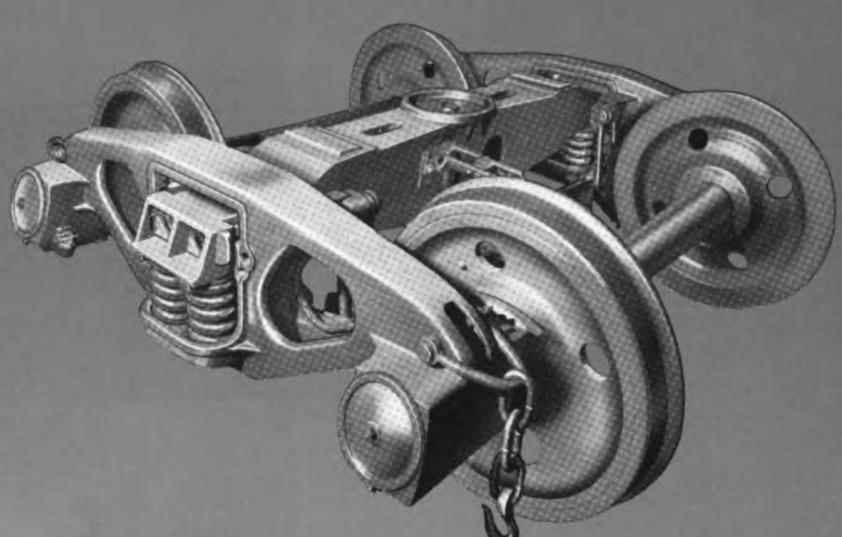
There's Improved Railroading Around the World with National Specialties

EXAMPLE:





C-1 TRUCKS



The sun never sets on National C-1 trucks. They are used by major railroads in many countries because C-1 Trucks provide a s-m-o-o-t-h, friction-controlled ride that results in lower maintenance for cars and trucks.

Heart of the C-1 friction-control mechanism is the wedge. Actual service records prove that C-1 wedges are still in top condition . . . even after travelling the equivalent of eight times around the world.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Railway Division Headquarters
Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

Established 1868

Canadian Subsidiary: National Malleable and Steel Castings Company of Canada, Ltd., Toronto 1, Ontario
Sales Representatives: The Holden Co., Ltd., Montreal 3, Quebec

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GEARED TO PROGRESS
P R I
MEMBER

Speer Brushes always make the grade....

Generator Brush
Speer Grade E44 Multiflex®

Traction Motor Brush
Speer Grade 6758 Multiflex®

with long life...outstanding performance

For the long haul, you will find that Speer brushes are service-designed to give you even wear, reduced vibration . . . improved commutation, longer service life.

Here are two Speer brushes that are especially designed for use on mainline locomotives:

Generator Brush (left above)
Speer's grade E44 Multiflex brush is a tough, dense grade developed specifically to give long, maintenance-free service on diesel-electric locomotive main generators.

Traction Motor Brush (right above)
Speer's grade 6758 Multiflex brush is a strong, dense, high, contact-drop grade for diesel-electric locomotive traction motors. Two independent sections give it all the advantages of a double brush—yet it operates in a single holder.

Speer offers a complete range of brushes. Every Speer brush is designed to give long, sturdy use under rugged operating conditions. Whether you maintain industrial motive units or higher hp diesel-electric locomotives, there's a Speer brush *made especially* for your equipment. Write today for full information.

If you have not received your free copy of our catalog, BRUSHES BY SPEER, send for it today.

SPEER *Carbon Co.*
St. Marys, Pa.

Name the load on your road

there's a Yellow Strand® Safety Sling to handle it!

Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

They can be tailor-made to specifically fit your needs. Just ask your Broderick & Bascom distributor, or write direct to us for specific sling information.

Diesel switch engine is safely and easily lifted with four M-1-AB Yellow Strand Braided Slings; each sling is 8 parts ¾" rope, 14 feet long.

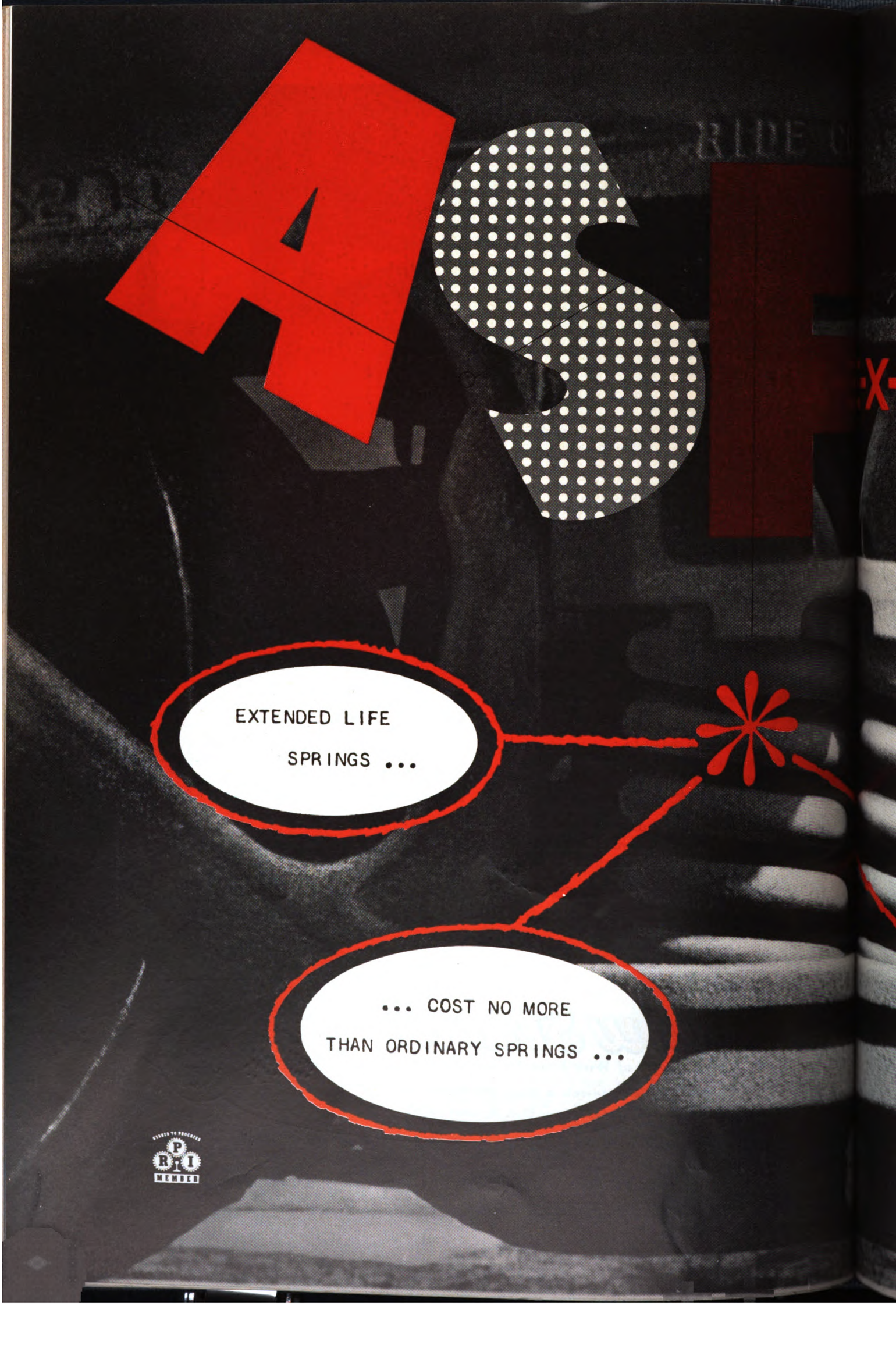
Yellow Strand®

Manufacturers of Wire Rope for over 80 Years

Broderick & Bascom Rope Co.

4203 Union Blvd., St. Louis 15, Mo.

American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.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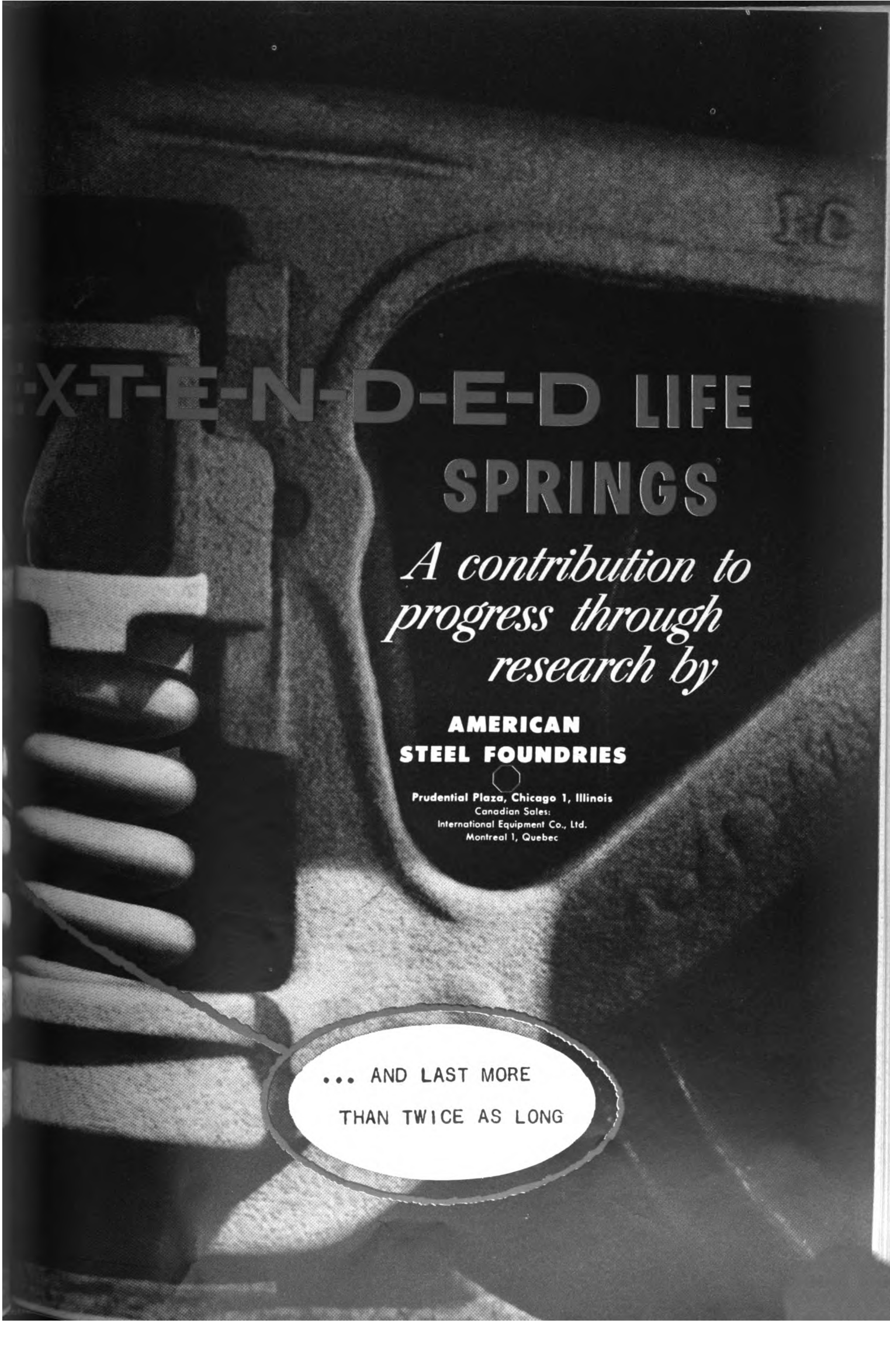
EXTENDED LIFE
SPRINGS ...
... COST NO MORE
THAN ORDINARY SPRINGS ...
MEMBER


E-X-T-E-N-D-E-D LIFE
SPRINGS
A contribution to progress through research by
AMERICAN
STEEL FOUNDRIES
Prudential Plaza, Chicago 1, Illinois
Canadian Sales:
International Equipment Co., Ltd.
Montreal 1, Quebec
... AND LAST MORE
THAN TWICE AS LONG

Answers to

about Kaiser Aluminum's purchase of

As part of its continuing growth program, Kaiser Aluminum & Chemical Corporation recently purchased the Wire and Cable Division of United States Rubber Co., located at Bristol, Rhode Island. The purchase raises a number of questions that are of direct interest to customers of both Kaiser Aluminum and the former Wire and Cable Division of U. S. Rubber. Here are the answers to those questions.

Q. Will all of the U.S. Rubber products still be available?

A. Yes, ALL of the wire and cable products formerly offered by U.S. Rubber will continue to be produced and sold—without changes of any kind.

Q. Who will back up the U.S. Rubber guarantees now? What about replacement?

A. Kaiser Aluminum will guarantee all U.S. Rubber Wire and Cable Division products now in use on the same terms as originally established, including replacement. Former U.S. Rubber products (which will continue to be offered) will carry the same guarantees as before.

Q. I have always liked the way U.S. Rubber people have served my needs; who will be doing the job now?

A. The same people who served you before will serve you now. The purchase includes acquisition of Wire and Cable Division's nationwide sales organization, as well as the plant work force of 1200 people.

Q. Will the price structure remain the same?

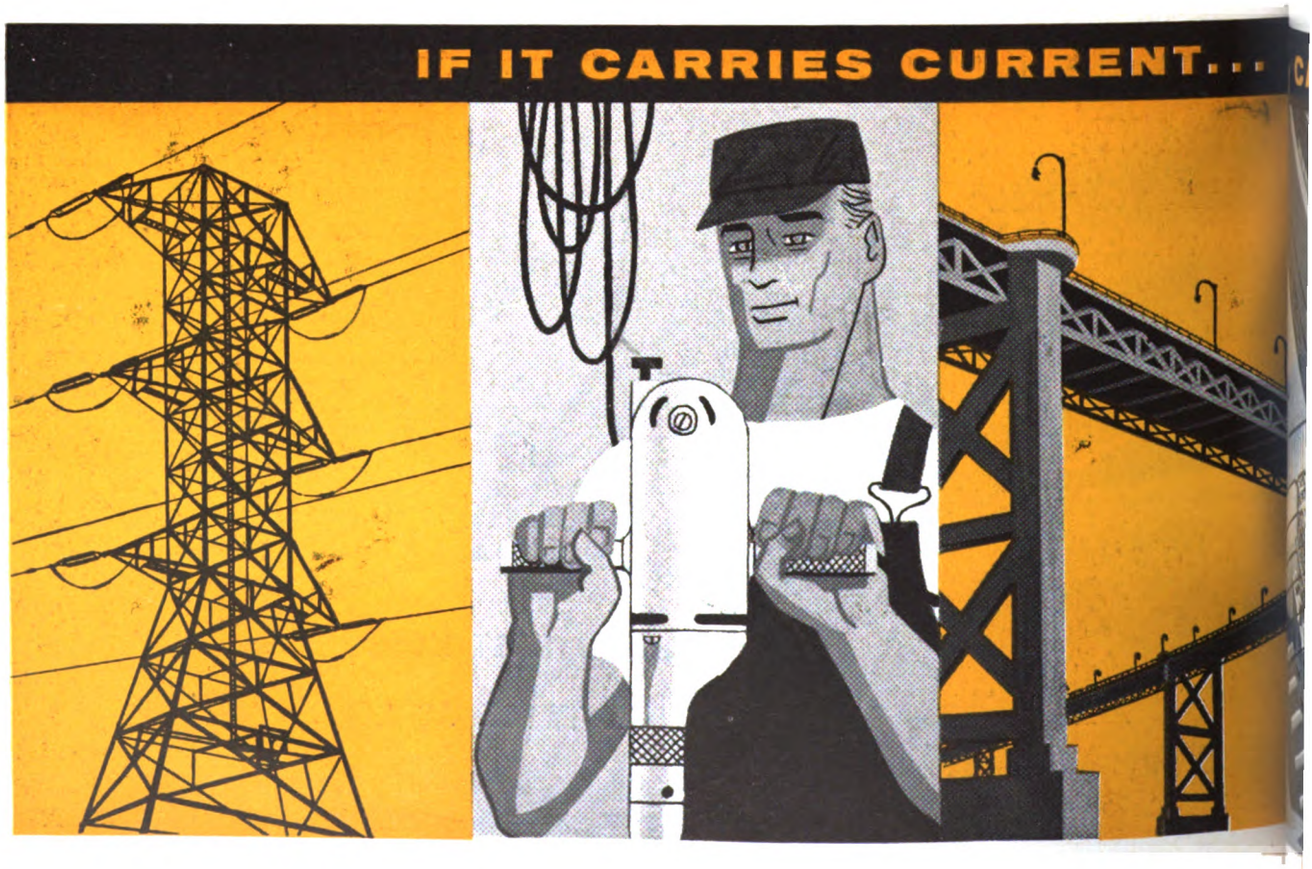
A. There will be no change in price structure as a result of the purchase. Kaiser Aluminum will continue to be a leader in maintaining a stable price structure throughout the market.

Q. Can I now buy both aluminum and copper electrical conductor from Kaiser Aluminum?

A. Yes—and in a wider variety than formerly available from either source. One of the primary effects of the purchase is to broaden the product range offered by Kaiser Aluminum in both aluminum and copper conductors.

Q. How about the insulations used in U.S. Rubber products: will the quality still be the same?

A. These high-quality insulations will remain exactly the same in every specification detail. In fact, they will be *supplied* by U.S. Rubber. Continued research cooperation will exist between the U.S. Rubber scientists and engineers and Kaiser Aluminum.



your questions

U.S. Rubber Wire and Cable Division

Q. Will new people from both companies be calling on me?

A. There will be no duplication of calls, because former U.S. Rubber personnel will be prepared to present the entire, broadened product line to those customers who can benefit by it. Occasionally, Kaiser Aluminum specialists will accompany the former U.S. Rubber representatives to help present the complete line. Conversely, Kaiser Aluminum Sales Representatives will be prepared to present the new, complete line to their established customers, assisted by former U.S. Rubber specialists.

Q. I formerly bought through a Kaiser Aluminum or U.S. Rubber distributor outlet. How will this be changed?

A. The distributor who formerly carried U.S. Rubber wire and cable will continue to offer the same products with no change. Present Kaiser Aluminum Distributor outlets also will remain unchanged.

Q. Will there be any effect on the Field Engineering Services formerly available through either company?

A. The technical assistance available to you will be greatly increased. Kaiser Aluminum—as the nation's largest producer of covered aluminum wire—is already a leader in research and product development, both in the laboratory and in the field. Now, by acquiring additional highly skilled technical personnel, these services will be further strengthened.

Q. How will the new setup affect my delivery date?

A. The convenience of a new eastern plant location, plus additional sales representatives and distributors, will mean even faster and more efficient service.

* * *

The purchase of the Wire and Cable Division of United States Rubber puts into operation the twenty-third plant for Kaiser Aluminum, which started with three plants just ten years ago.

This growth is based on the continued support of our customers, who, working with us, have helped to make Kaiser Aluminum the nation's fastest-growing major producer of aluminum. This latest acquisition represents another step forward in our program of complete service to the nation's rapidly-expanding electrical industry.

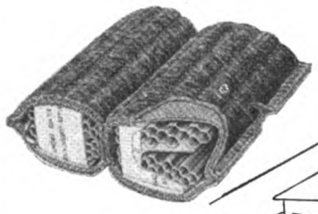
Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Bldg., Oakland 12, California; *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois.

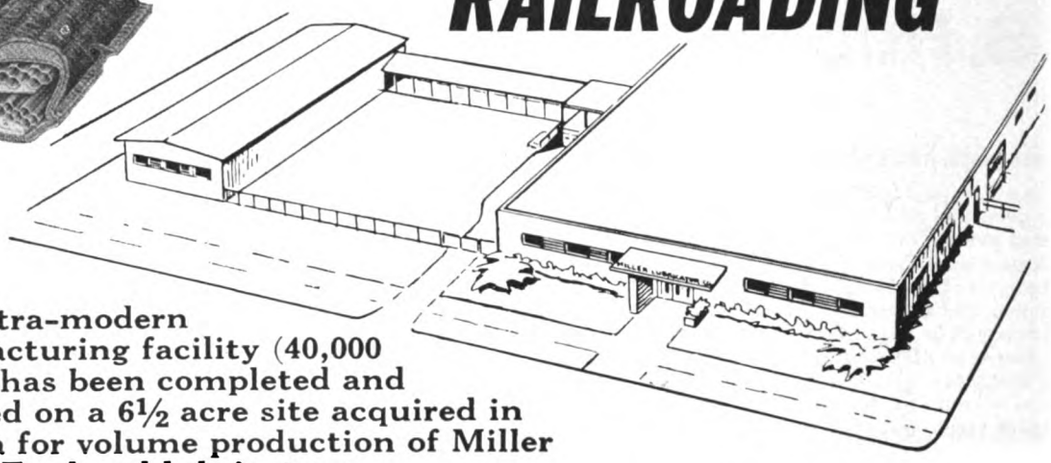
Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

78,000 CARSETS TO DATE

FOR PROGRESSIVE RAILROADING





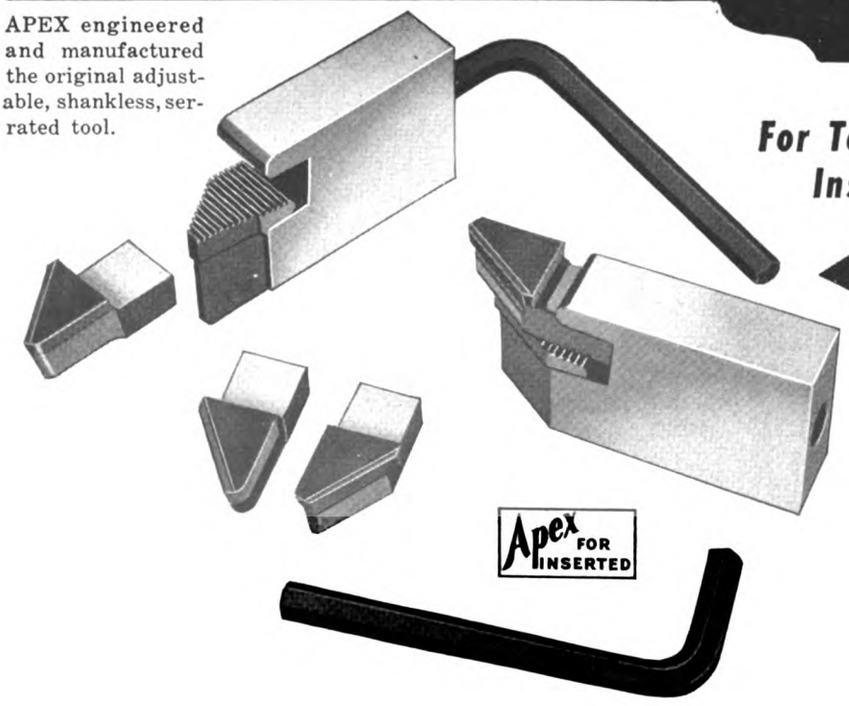
This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller Center Feed pad lubricators.
Additional capacity, regardless of amount, to meet every Railroad requirement will be installed promptly when needed. 30,000 sq. ft. will be added early 1957.

- *Volume quantities—immediate delivery*
- *Cost—$40 per carset (for all sizes)*
- *Life expectancy—6 years*

MILLER LUBRICATOR CO., WINONA, MINN.

PRODUCTION TOOLS by APEX

APEX engineered and manufactured the original adjustable, shankless, serrated tool.



For Tooling Economy Use APEX Inserted Tools For Axles

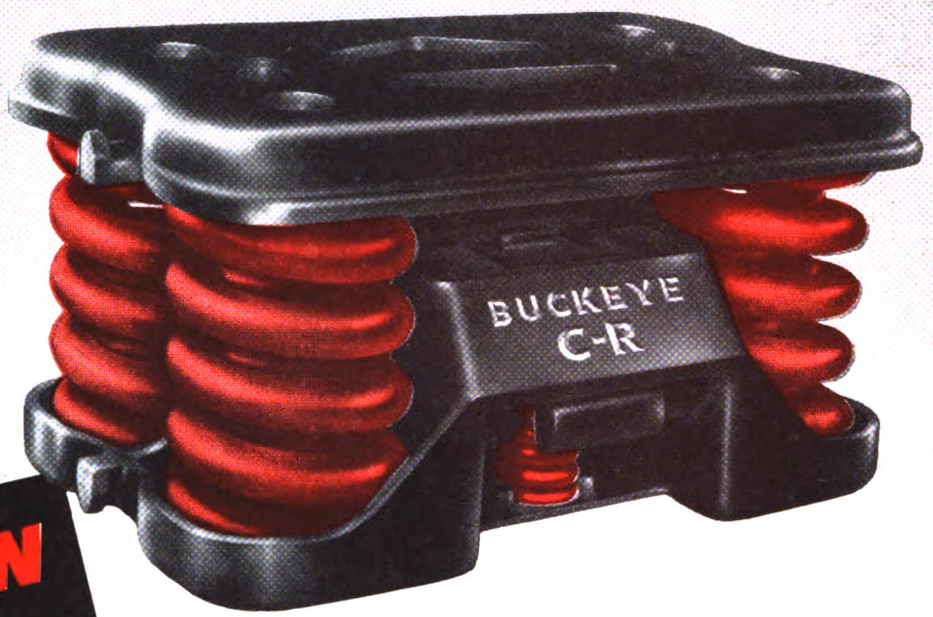
•

← HOLDERS AND TOOLS for "SELLERS" AXLE LATHE

We manufacture holders and forged inserted tools for roughing and finishing axles and wheels. Form tools to your specifications. Send for book on APEX tooling for railroad work, or the the APEX catalog. Our engineers are always ready to help you with tooling problems.

THE APEX TOOL & CUTTER CO., SHELTON 22, CONN.

LOW COST MODERNIZATION FOR CARS OF ALL CAPACITIES..



NEW

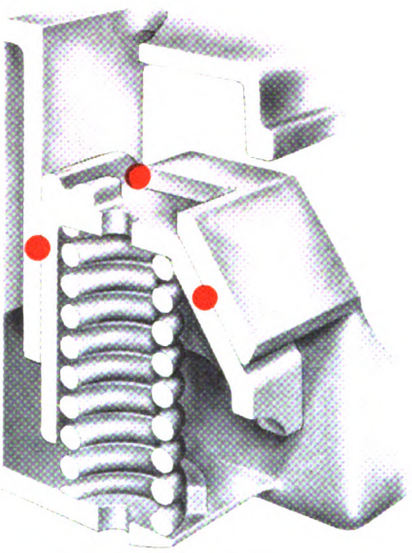
C-R®

(Cushion-Ride) PACKAGE UNIT

Applicable to *all* previously built, non-friction control trucks. Available with 2-1 2″ or 3-1 16″ spring travel.

ENGINEERED and BUILT BY

Buckeye



CUTAWAY OF THE BUCKEYE C-R PACKAGE UNIT SHOWING THE FEATURED MAXIMUM FRICTION BEARING SURFACES.

FOR COMPLETE INFORMATION.. CALL OR WRITE

Refer Adv. 11880

Ask for Bulletin No 204

The Buckeye Steel Castings Co.

RPI MEMBER

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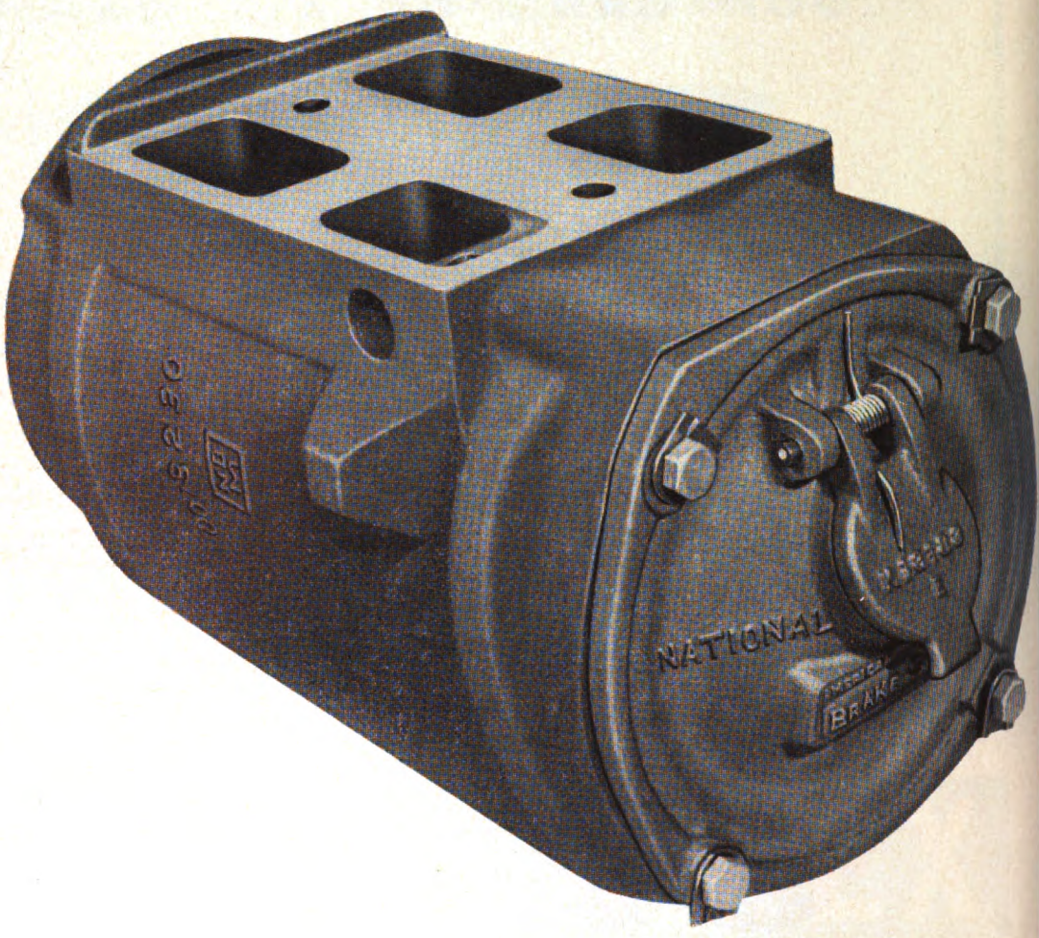
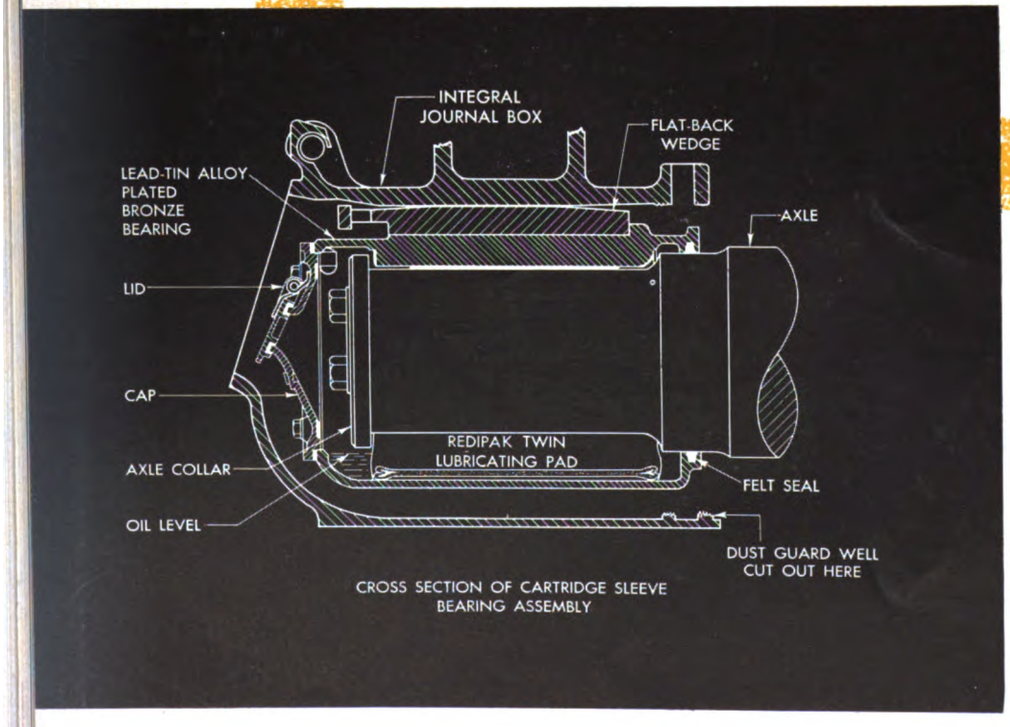




CROSS SECTION OF CARTRIDGE SLEEVE BEARING ASSEMBLY

The cartridge bearing completely encircles the journal. The journal collar is machined off to permit assembly, and a separate collar is secured with cap screws. The cartridge unit is cast of high strength bronze and plated with a heavy-duty lead-tin alloy. It contains its own lubricating system and is effectively sealed by a lubricated felt ring riding on the conventional dust guard diameter. The Redipak twin lubricating pad is installed when the cartridge is applied to the axle. Oil is contained in the cartridge, not in the box. The usual journal box lid is not needed.

Here Comes the New National Cartridge Bearing!

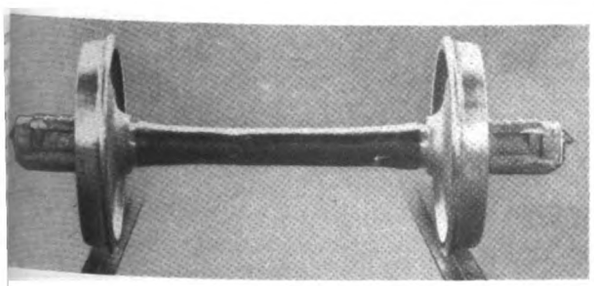
Road service has demonstrated that this economical sleeve bearing stands up under today's toughest freight car service

This revolutionary new concept in journal bearing design—now being road tested—may well become the freight car bearing of the future. The National Cartridge Bearing is a complete, sealed bearing and lubricating system. It neatly fits a standard journal box after the dust guard well has been cut out. The bearing completely encircles the journal—so it cannot lift or shift—and contains its own oil reservoir, Redipak® twin lubricating pad, cover and seal.

Here are a few of the principal advantages offered by the cartridge bearing unit: It stands up to greater impact and braking forces than do roller bearings. It requires very little maintenance—just an infrequent check of oil level and occasional replenishment of oil supply. It assures longer life—no measurable wear on either bearings or journals in over a year's accelerated road service. It minimizes the chances of hot boxes. And finally, it provides savings in initial costs when compared to roller bearings . . . savings in installation and replacement costs . . . and savings in removal costs when a wheel change is needed.

Present service tests on three roads have proven excellent and are validating our laboratory findings. Approved by AAR for test in interchange service.

A-4682

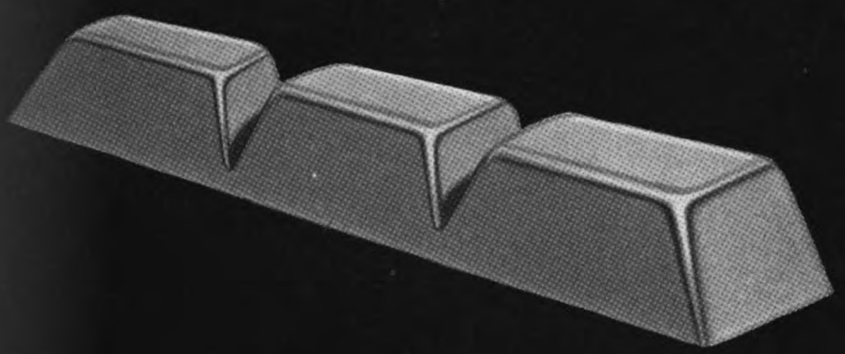


Wheel, axle and cartridge sets are made up in advance for assembly into trucks. No bearing work is done on the rip track.

AMERICAN
Brake Shoe
COMPANY

Railroad Products Division
230 PARK AVENUE • NEW YORK 17, N. Y.

Forecast: Aluminum Consumption



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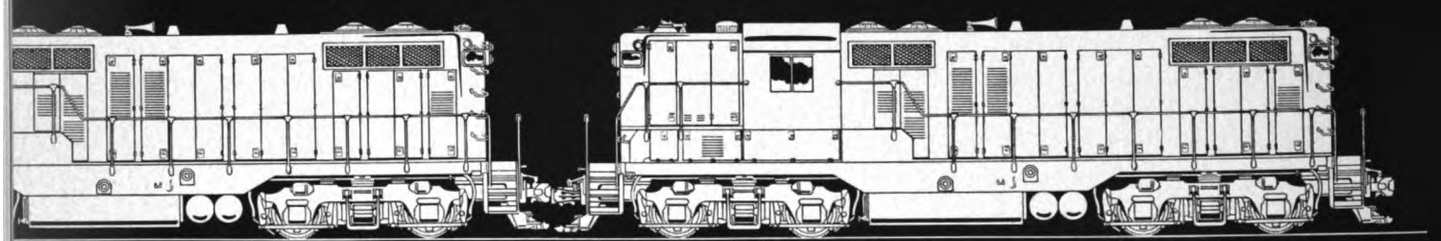


Will your present motive power

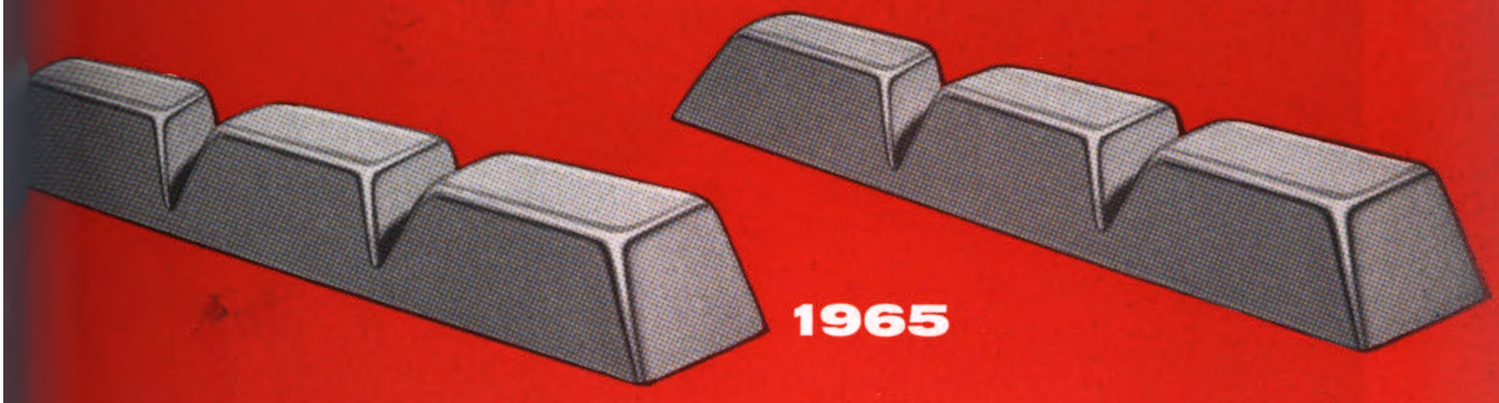
Now is the time to plan for increased traffic, not only for aluminum and aluminum products, but for steel, chemicals, foodstuffs and nearly all other basic products, most of which will exert comparable demands on rail transportation in the growth years ahead.

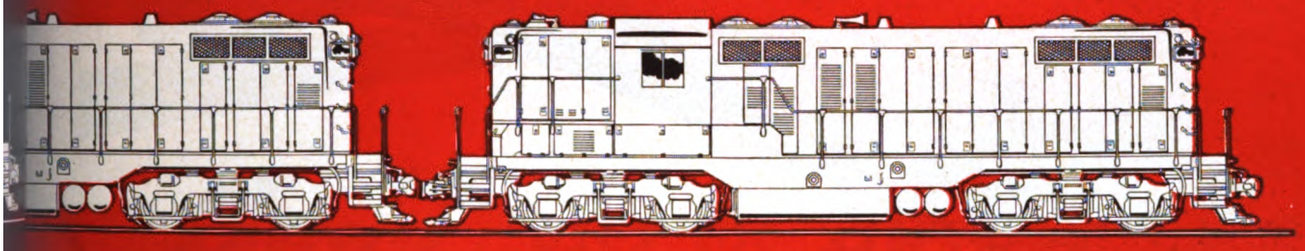
Electro-Motive is showing its faith in this growth potential through a forty-two per cent expansion of manufacturing facilities. We are now in a better position than ever to plan with you a realistic program of motive-power acquisition and modernization that will *give you power when you need it.*

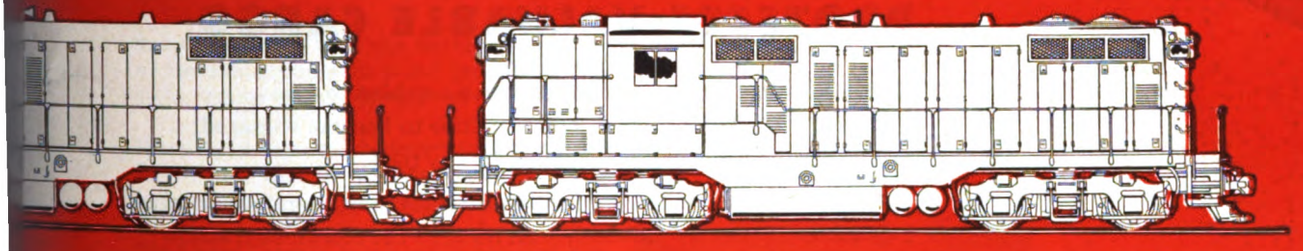
Through a planned, step-by-step program you will be able to match power to growth conditions as they occur, thus avoid delays costly both in revenue and goodwill.

And Electro-Motive offers the opportunity of anticipating this increasing traffic

mb double by 1965*







lo the job?

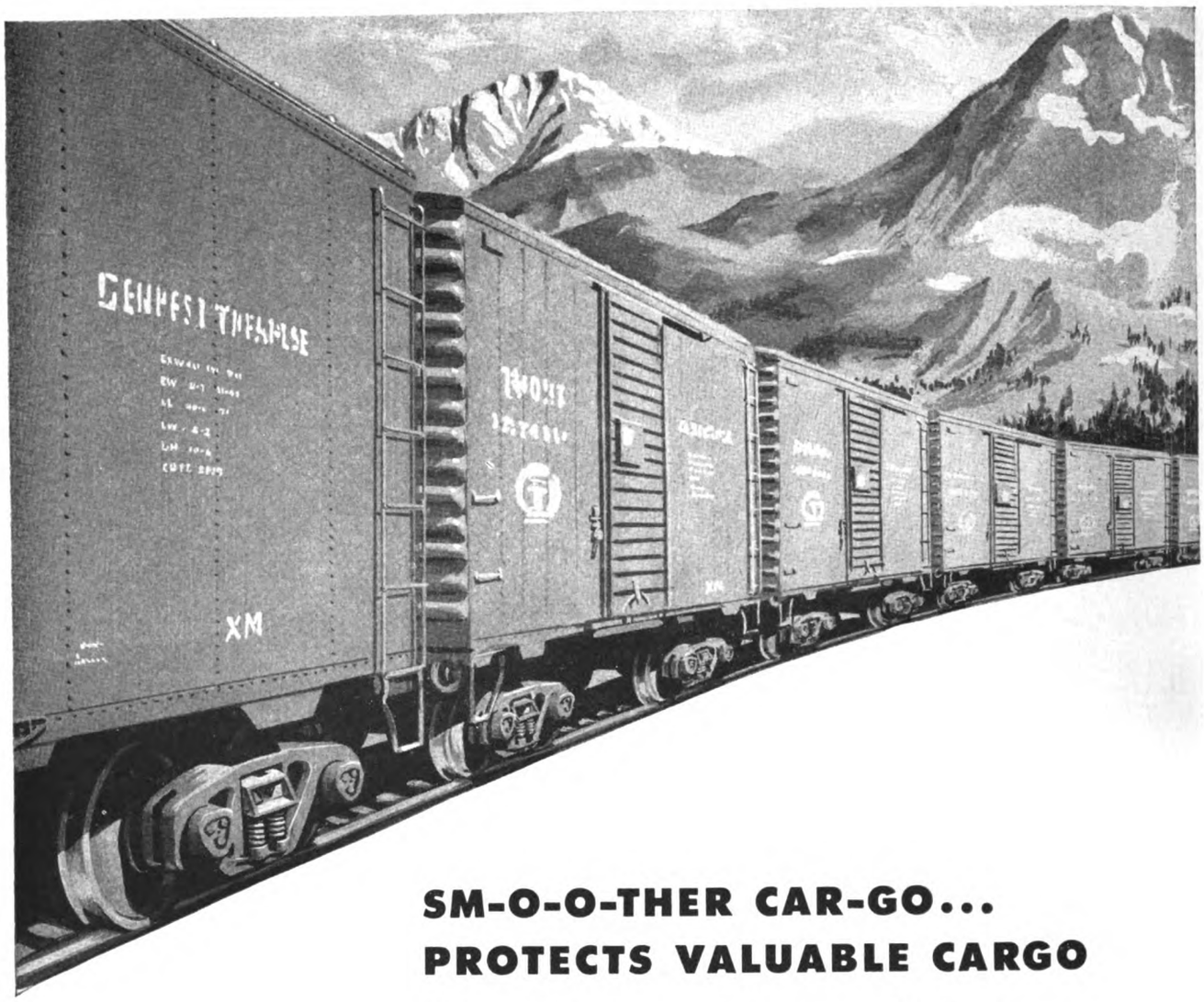
* Aluminum producers expect the use of aluminum in such things as buildings, freight cars, automobiles, packages, cans and other new products will double consumption in the United States by 1965.

with fast, dependable, economical motive power—either from our constantly improving line of General Motors locomotives, or through our modernization facilities that make new locomotives from old.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

La Grange, Illinois • Home of the Diesel locomotive
In Canada: General Motors Diesel, Ltd., London, Ontario



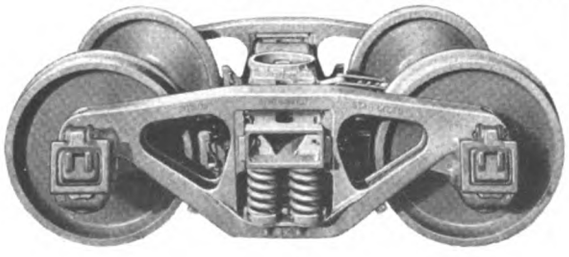
SM-O-O-THER CAR-GO... PROTECTS VALUABLE CARGO

Higher speeds! Tighter schedules! These combine to give equipment and ladings many opportunities to become damaged. Damage claims are a serious problem for any road.

Barber Stabilized Trucks give smoother rides, maximum protection. Destructive forces are self-dampened through the coordinated action of Barber Stabilizer components. Actuating springs, friction shoes and special wear plates . . . arranged in a unique and ever-ready suspension system . . . guard against vertical shocks and bouncing, increase their frictional resistance on the downward stroke. Over-solid spring blows are eliminated!

Two bargains in one! Barber Stabilized Trucks save your ladings; save your equipment.

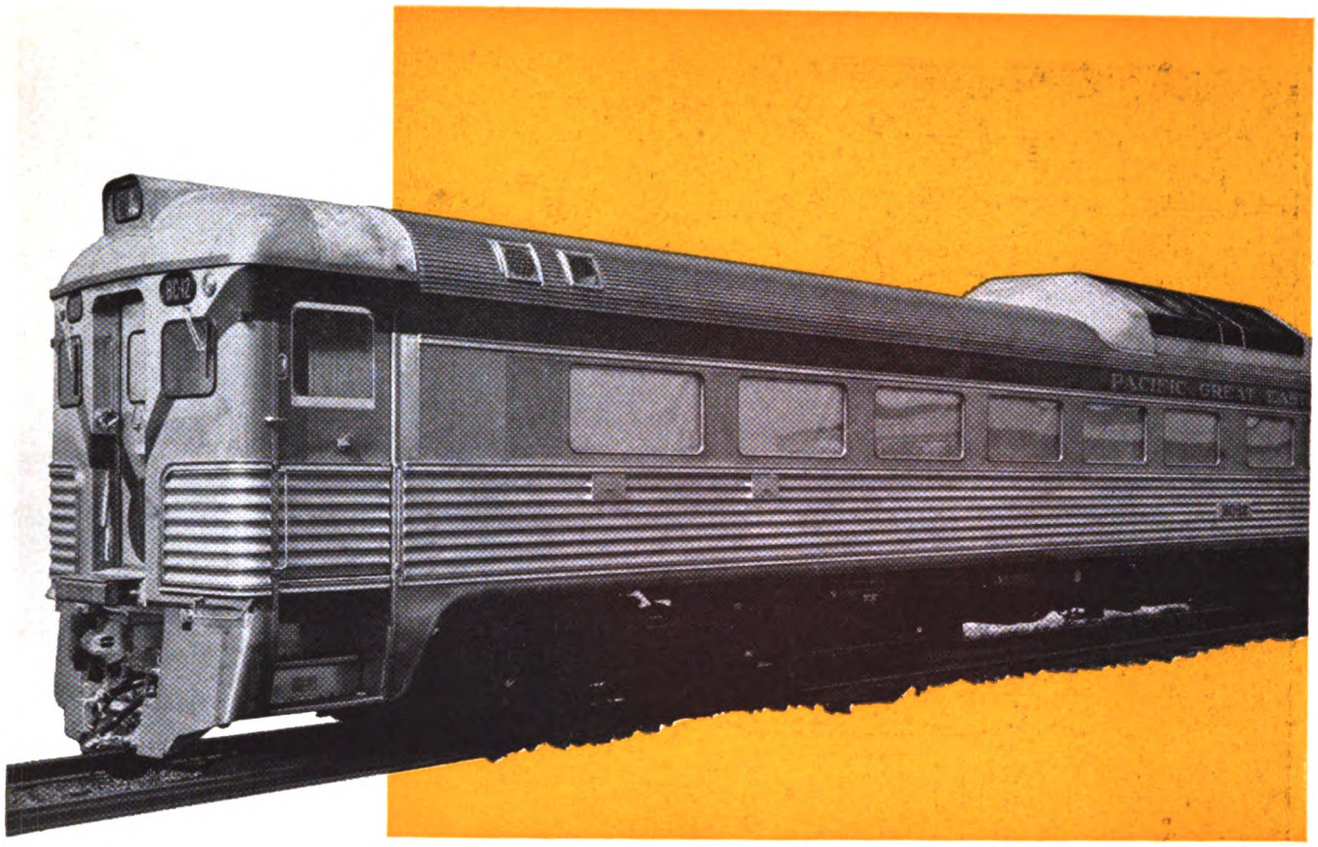
Quicker, Easier Servicing, Too . . .



BARBER

STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.



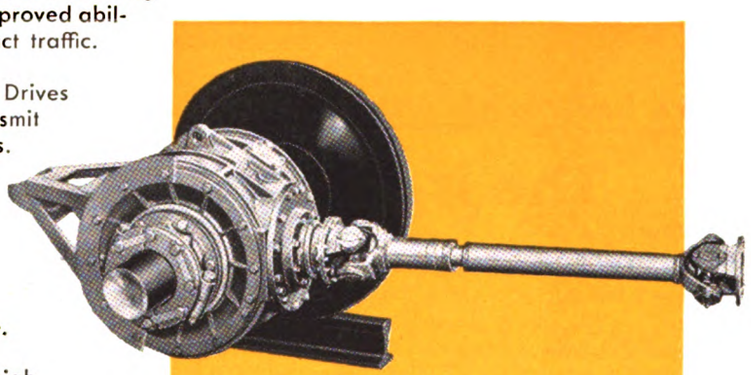
Budd uses the Spicer Drive for swift, economical Rail Car service

Budd Rail Diesel Cars are being adopted in ever-increasing numbers throughout the world because of their proved ability to reduce costs, improve service and attract traffic.

These Budd cars are equipped with two Spicer Drives that mount directly on the axles, and transmit power from the diesel engines to the wheels.

The Spicer Drive is a self-contained unit employing ground spiral bevel gears, with all wearing parts running in a constant bath of oil, completely sealed and protected from ballast, dirt, water, snow, etc., for long life and freedom from maintenance.

This unit incorporates the same features of high efficiency, economy, safety, quietness, and smoothness associated with over 12,000 Spicer positive generator drives in use on railway Pullman coaches, diners, and other rolling stock throughout America.



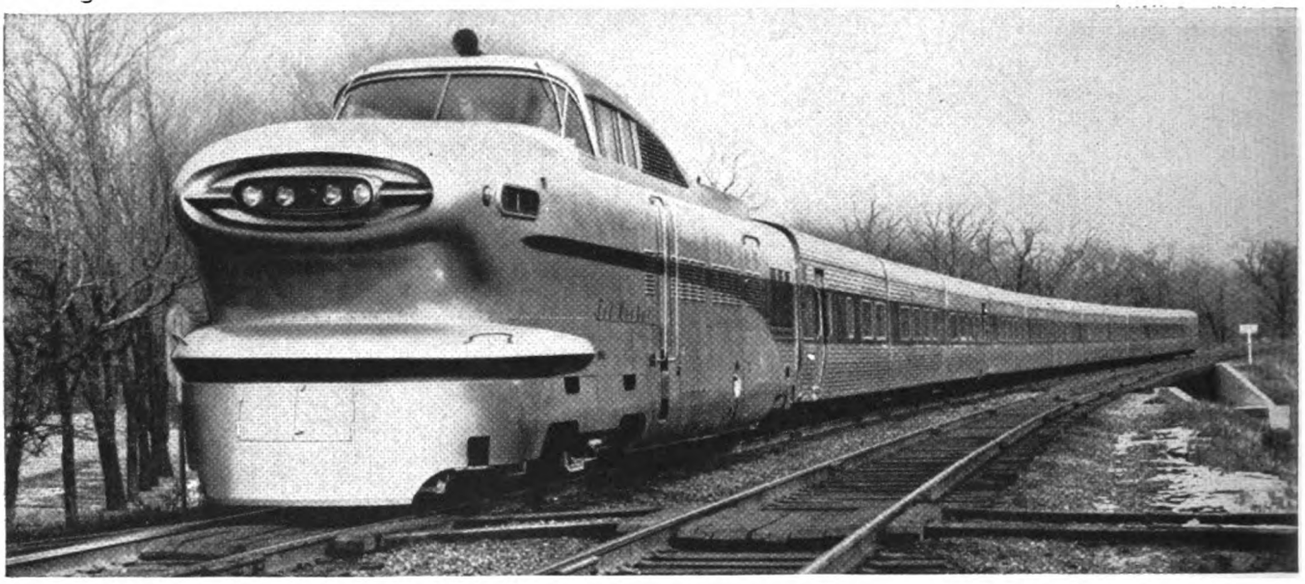
The Spicer Model 8 Drive as used in Budd Rail Diesel Cars.

Spicer

DANA CORPORATION

TOLEDO 1, OHIO

SPICER PRODUCTS: Transmissions • Universal Joints • Propeller Shafts • Axles • Torque Converters • Gear Boxes • Power Take-Offs • Power Take-Off Joints • Rail Car Drives • Railway Generator Drives • Stampings • Spicer and Auburn Clutches • Parish Frames • Spicer Frames



New train is sleek . . . low . . . light. Jet Rocket highballs along Rock Island's tracks. Gleaming stainless steel body and strong USS T-1 alloy steel underframe both contain nickel and contribute to a safer and lighter, modern train.

Cars built with steels containing nickel

The iron horse gets its second wind

It's here! The proven Talgo, backed by over 1,000,000 miles of service in Spain . . . it's Rock Island's "Jet Rocket." Built by American Car and Foundry Division of ACF Industries, its design promises to revolutionize American railroad passenger travel.

Nickel has a vital part in this. The modern Jet Rocket costs less to build, and its light weight, low center of gravity and speed mean it costs less to run and maintain.

The Jet Rocket, like most other new lightweight trains, is sheathed in gleaming stainless steel. For with nickel this alloy is strong, tough and corrosion resistant. Cars can carry more pay load per square foot and always look clean.

Nickel is also an essential alloying element in the high-strength USS T-1 steel used in the under-frames of the Jet Rocket. Every pound of alloy steel does a bigger job, because, pound for pound, such steels are stronger, more resistant to impact, and offer clear-cut weight savings.

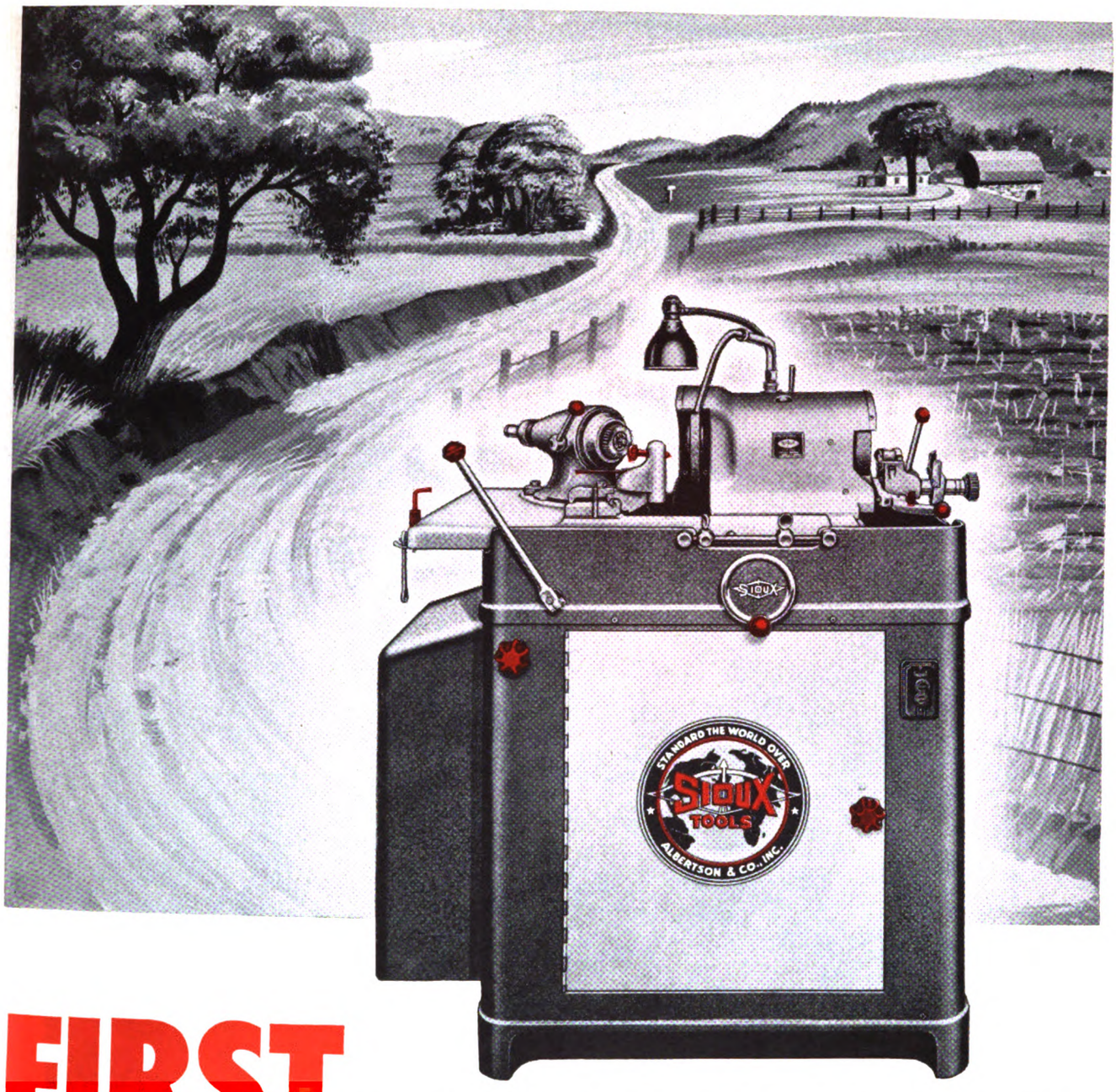
Do you have a problem involving metals? Are corrosion, high temperatures, stresses, or fatigue causing trouble? Let's talk it over. We may be able to find out how nickel or a nickel alloy can overcome it.

* * *

Write for "List A" of available publications. It includes a simple form that makes it easy for you to outline your problem for study.

Nickel Alloys perform better, longer

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N. Y.



FIRST BY A COUNTRY MILE!

Ever since Valve Face Grinding Machines were invented, men who had to lay down their hard earned cash, have been comparing and choosing the one they liked best. *Today there are more* SIOUX *Valve Face Grinding Machines in use throughout the world than all other makes combined.*

There can scarcely be any stronger testimony to the superiority of one machine than the overwhelming choice of so many buyers over so long a time. You can buy your SIOUX Valve Face Grinding Machine with the utmost confidence in your choice.

SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U. S. A.

ELECTRIC DRILLS • SCREW DRIVERS • SANDERS • GRINDERS • IMPACT WRENCHES • VALVE FACE GRINDING MACHINES • POLISHERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS

NOW AVAILABLE FROM MOTOR WHEEL

FLEXO 4

MALLEABLE IRON Journal Box Lids

CONTROLLED FLEXIBILITY

Spring-controlled construction compensates for varying condition of journal box mouth and hinge-lug wear.

TIGHT FIT

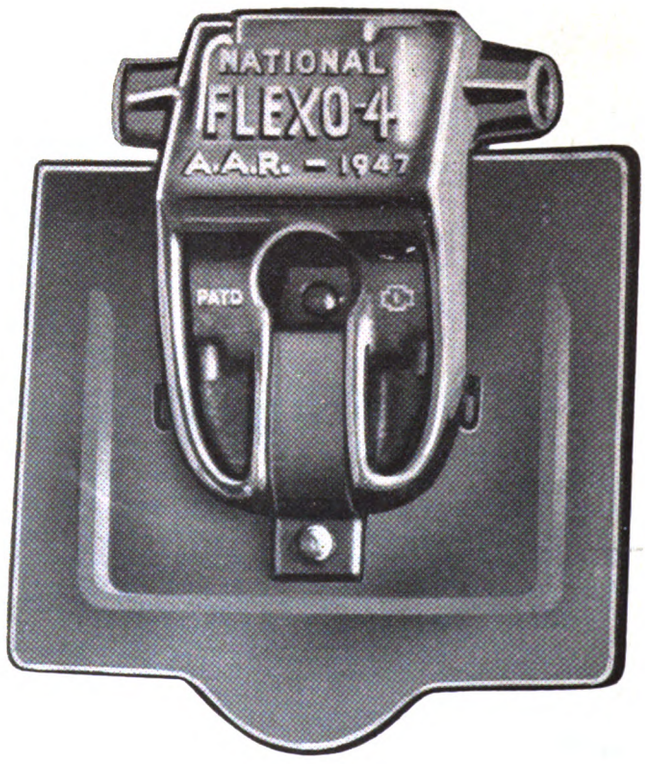
Keeps oil in and dust, dirt and water out.

LONG-LIFE MALLEABLE IRON

Lid life lengthened by physical properties that resist corrosion, shock and distortion.

POSITIVE OIL RETURN LEDGE

Conserves oil by keeping it from seeping out at mouth of journal box.



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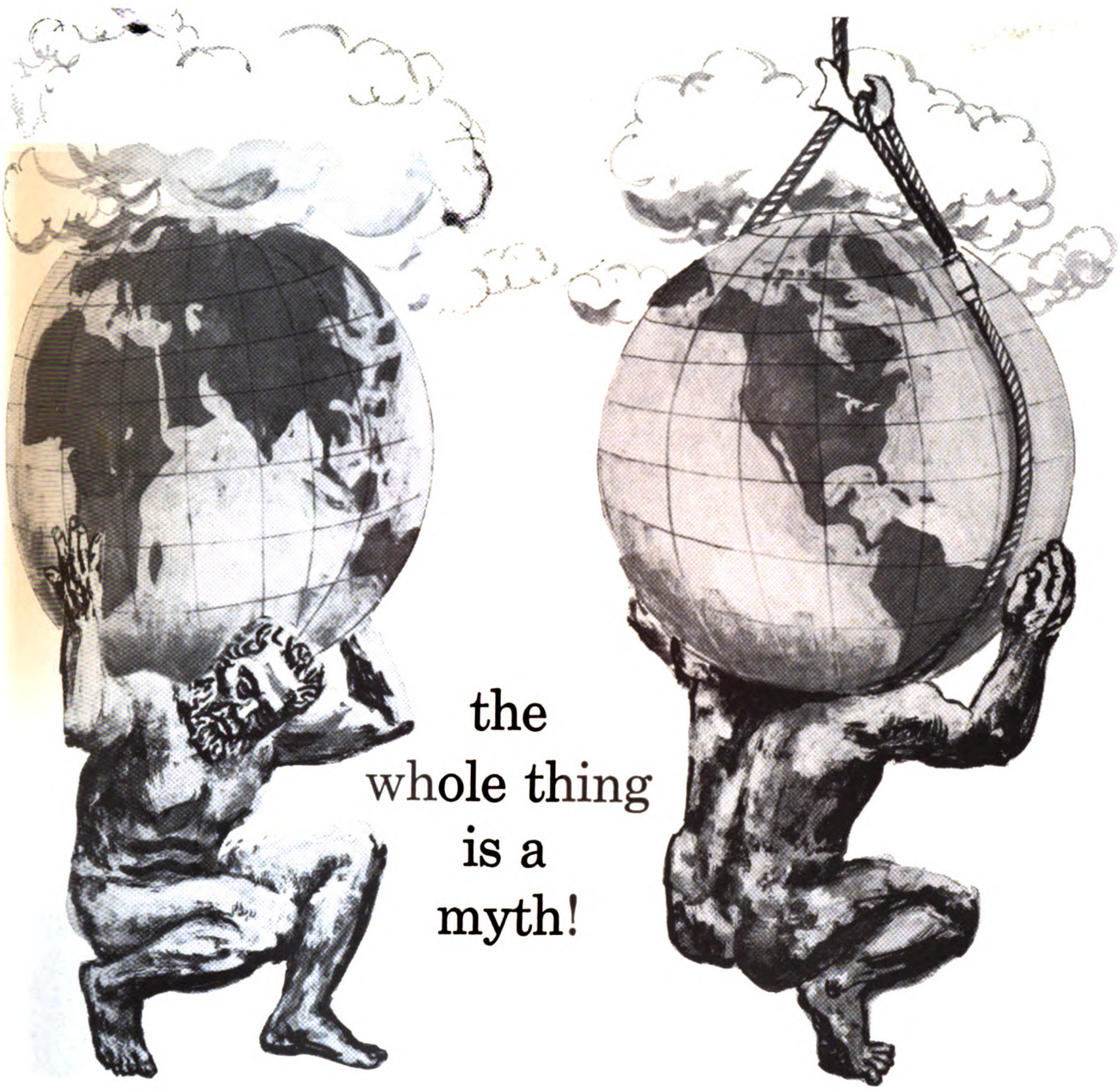
MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN

National Railway Sales Representatives
T-Z RAILWAY EQUIPMENT CO.
G. S. TURNER, *President*
8 South Michigan, Chicago 3, Ill.



the whole thing is a myth!

...the work is done by a Roebling Sling!

It's a fact that holds true for lifting jobs in almost every industry you can name. The types of slings and fittings that are manufactured by Roebling would fill a book (and they *do*—a 51-page catalog that's yours for the asking).

The endless and often monumental materials handling needs of industry are met, in every respect, by the complete and completely dependable Roebling Sling line. They include: All-Purpose Slings, Grommet, Roegal® Cable-Laid, Flatweave and Railroad Slings; Flatweave Drawbar and Plate-Lifting Slings and a full line of end fittings. Within each of these categories are a variety of sizes, strengths and capacities.

Certain facts apply to all Roebling slings, whatever their use: advanced construction features certify safe, steady service and stability under load.

The new catalog that we'd like to send you is designed to make sling selection and ordering as easy as the job a Roebling Sling performs. Ask for A-931. Meanwhile, if you have any materials handling questions or want further sling information, your Roebling salesman or distributor will hasten to help you out. Write to Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

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SEVENTEEN CARS on a crack passenger run in the South were equipped with Cobra Shoes. Here are the results for average yearly mileage of 300,000 miles per car compared with a companion train equipped with cast-iron shoes:

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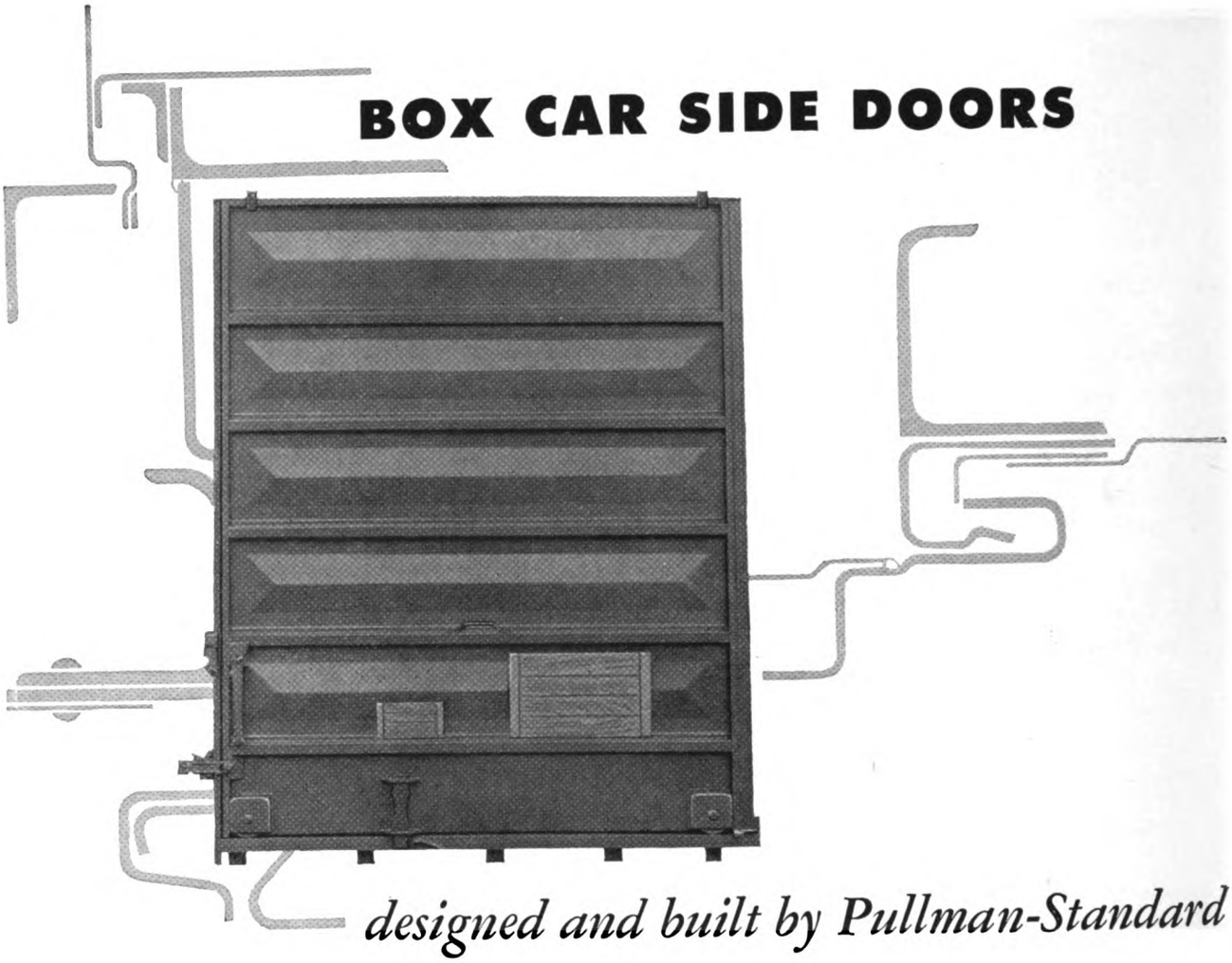
**Registered U. S. Trademark*
Composition Brake Shoe

FOR RAILROAD CARS, LOCOMOTIVES AND RAPID TRANSIT CARS.

RPORATION, Wilmerding, Pennsylvania

BOX CAR SIDE DOORS



designed and built by Pullman-Standard

- **Design: by the world's largest car-builder . . . with fifteen years' experience in door manufacturing.**
- **Size: 9′ 11″ or specified height. 6′-7′-8′-9′ or specified width.**
- **Complete with fixtures and subparts, all to P-S design.**
- **Panels of .10-inch corrosion-resistant copper bearing steel. Lock, starter and bumper of cast steel. All parts weldable.**
- **Extra-heavy (5/32-inch) bottom member.**
- **5″ rollers in door roller assembly insure easy operation.**
- **Precision fabricated, embossed for strength, assembled by arc-welding.**
- **All around sealing arrangement excludes dirt and weather, safeguards lading.**
- **Self-protecting design and fabrication excellence mean long life, easy maintenance.**

Pullman-Standard has designed, built and laboratory and service tested a new box car side door, with integral fixtures, to fill the needs and specifications of the railroad industry. Offering maximum lading protection from dirt and weather, this new door is sealed all around by specially designed interlocking contours. The unit rolls smoothly and easily on large 5-inch diameter rollers with hardened roller bearings. The safety latch and door lock work as a unit. And the safety latch automatically locks the door in either the open or closed position after one car impact. The entire door and fixture unit is made for lasting service, durability and rugged strength.

After extensive field research to determine railroad and shipper requirements, prototypes of this door were designed, built and put into continuous laboratory and in-service tests more than three years ago. Every possible test was applied time and time again. The P-S Door withstood every abuse. Example: over 75,000 severe individual roller and bearing impacts were test-applied to prove the door roller assembly.

Confirming "on the job" acceptance of this new unit by America's railroads are the more than 2500 car sets now in service or on order by 12 major users.

Replacement parts will be kept on hand by Pullman-Standard, and railroad orders will be filled immediately from inventory.

For full information on the new P-S Box Car Side Door, and how it can be applied to PS-1 Box Cars now on order, write for literature or contact the nearest Pullman-Standard sales office.

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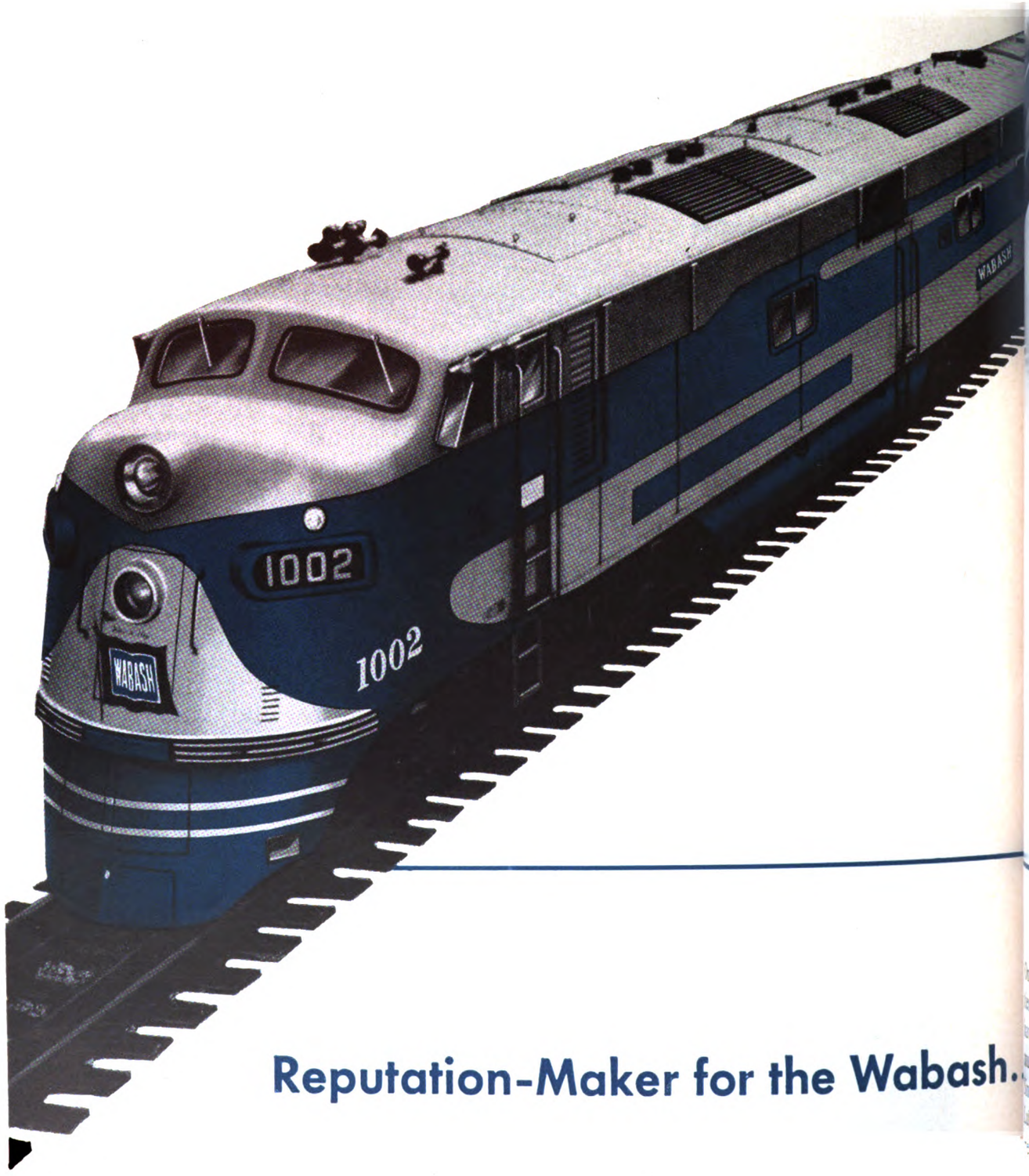
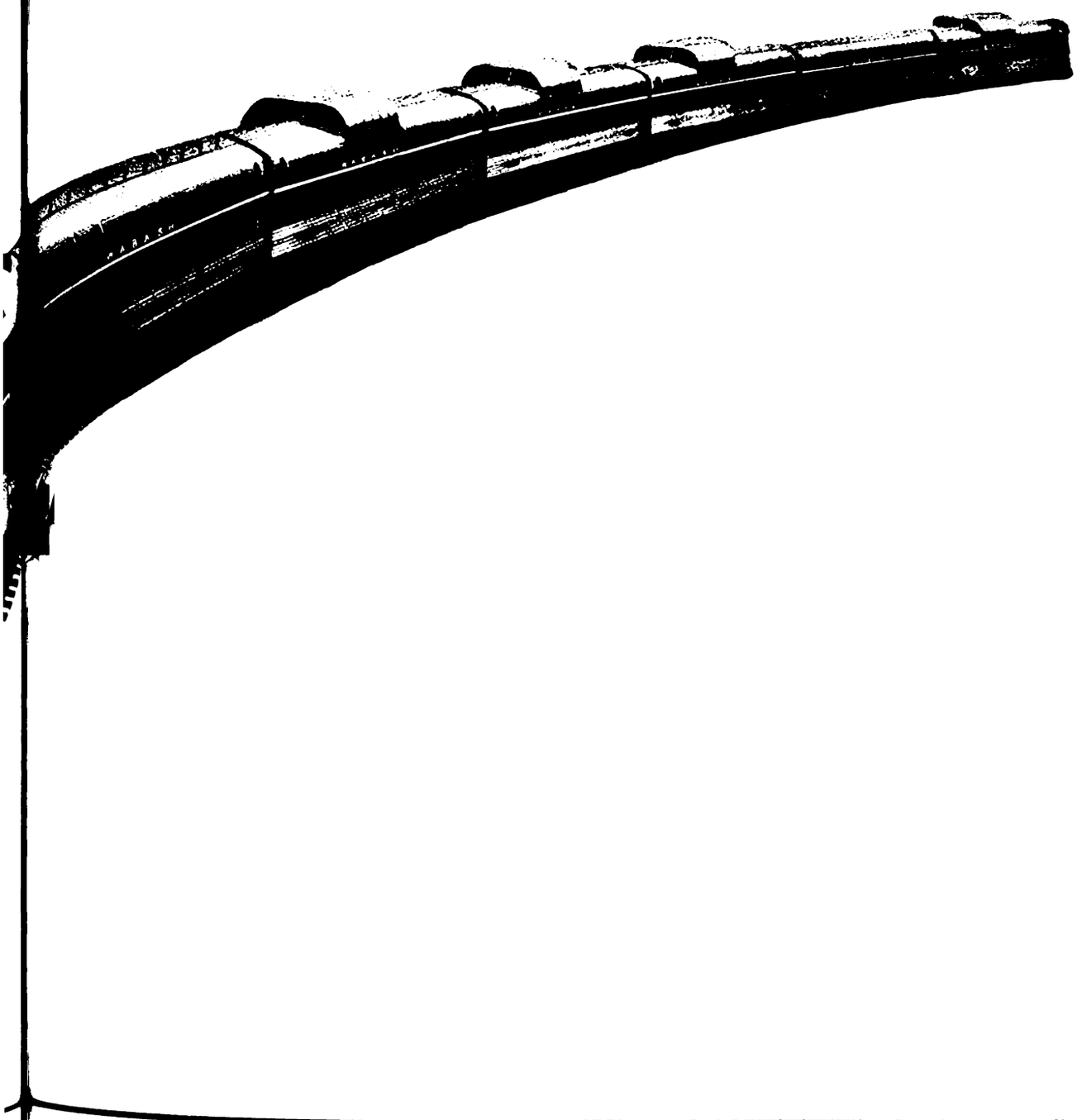


Reputation-Maker for the Wabash.



One of the nation's most famous trains, the Wabash streamliner "Blue Bird", ties Chicago to St. Louis with an enviable record of on-time service. Passengers have come to rely on the comfort and dependability of this fast blue beauty — much as the Wabash has come to rely on Sinclair for lubricating protection. Sinclair is proud to supply the pride of the Wabash with GASCON® Diesel Lubricating Oil... honored, too, that the record shows over 100 U. S. railroads specify this outstanding Diesel lubricating oil.

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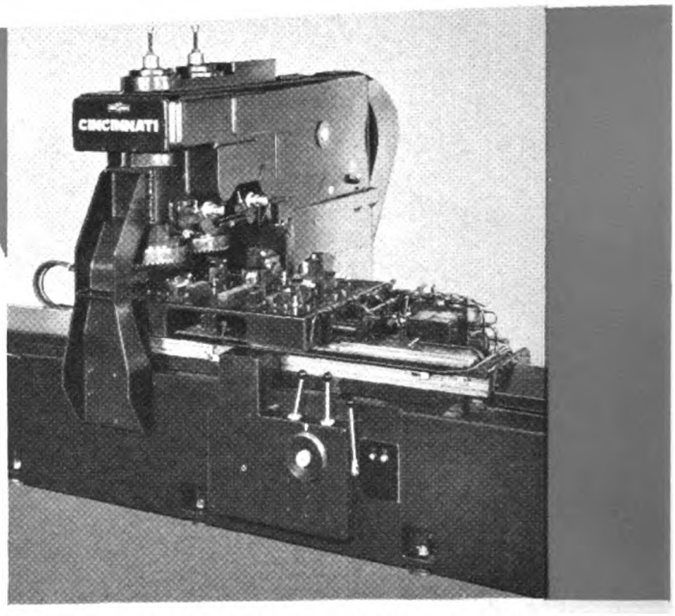
Easy on your Replacement Fund---



HyPowermatic with 50 hp main drive and two vertical spindles in a fixed housing, tooled up to mill the top and combustion face on cylinder heads. Many standard HyPowermatic units and features are incorporated in this machine.

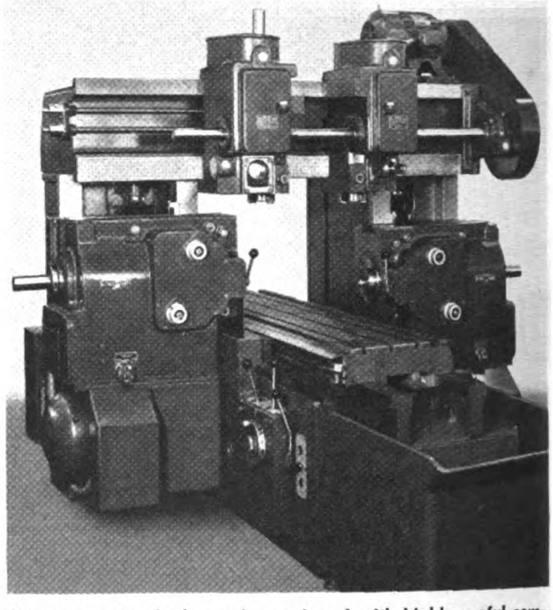
Cincinnati HyPowermatic Unit Construction Plan

Don't discard new production milling ideas as being too costly without considering Cincinnati's HyPowermatic unit construction plan. You may find that a special machine is entirely unnecessary. HyPowermatics are assembled from standard and complementary units to give you unusual combinations such as:

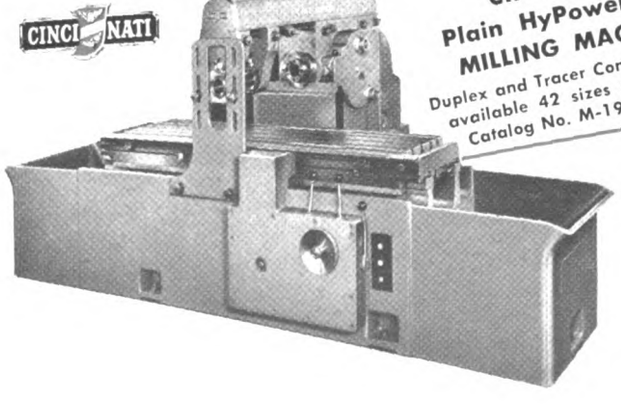
1) Close-coupled spindle carriers
2) Vertical and angular spindle heads; many styles and combinations, including adjustable angle
3) Ram mounted spindle heads
4) Fixed height or adjustable bridge type rail support for vertical spindle heads

Take a look at the heavy duty automatic milling machines in your shop which may have become productively obsolete. You may be surprised to see how much you can gain—in production and lower unit cost—by replacing with CINCINNATI® HyPowermatics, built up with standard and complementary units to suit the job. They offer many cost-cutting replacement possibilities. May we send you a copy of the new, fully illustrated catalog? For brief specs, look in Sweet's.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



HyPowermatic, duplex style, equipped with highly useful complementary units consisting of two additional spindle heads mounted vertically on a cross rail. This HyPowermatic can mill simultaneously the sides and top of box-shaped parts.



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Plain HyPowermatic
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METAL FORMING MACHINES • HARDENING MACHINES • OPTICAL PROJECTION
PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS

Fuel tests on six General Motors road units were method C&NW used for arriving at answers on future fuels.

Lower Grade Oil Testing Brings Decision . . .

C&NW Diesels Will Not Get 'Economy' Fuels

The Chicago & North Western has decided that the disadvantages of using a lower grade fuel oil quite outweigh any advantages gained. After a thorough study and analysis of the results of diesel locomotive tests averaging eight to nine months with six General Motors units, the C&NW is no longer considering the future use of lower grade fuels. The road will use a grade of distillate in keeping with the specifications of the engine manufacturers.

The tests were run to explore the potential use of a lower grade fuel at a reduced purchase price in terms of diesel engine performance and overall economy. Some of the disadvantages found with the test fuel are instability of the fuel and the increased maintenance due to greater wear and deposits in the engine. There is also a definite relationship between the quality of the fuel, lubricating oil deterioration and consumption, and the locomotive operating efficiencies, engine wear and deposits.

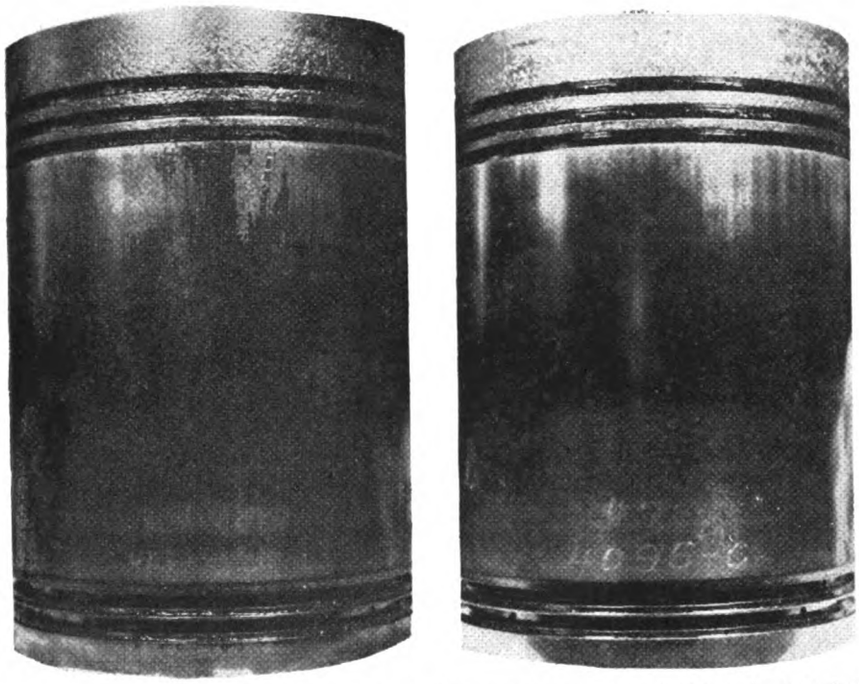
In April 1955 the C&NW placed in test service six EMD units—four operating as two locomotives using test fuel, the other two operating as one locomotive using regular fuel.

Each unit was powered by a 1,500-hp EMD 16 cylinder, V-type, 2 cycle diesel engine, type 16-567B. All parts of the engine were standard as specified by the engine manufacturer. Two completely new or reconditioned power assemblies were applied to each engine in opposite banks, the No. 7 and No. 15 positions, at the same crank location.

These units were used in pool service operating in tonnage road freight service over relatively level terrain, with a maximum gradient of approximately 1.26%, and with many curves.

The locomotives handled tonnages ranging from 1,900 minimum to 6,500 maximum, and maintained average speeds of 30 mph, with maximum speeds of 45 mph. Sanding was used under power and when braking. Special fittings were installed on the fuel tanks of units using the test fuel so that mixing with any other fuel could not occur.

The crankcase lubricating oil used was a regular heavy-duty de-



Heavier deposits of carbon and lacquer showing typical condition of piston in test fuel units (left), and regular fuel units (right). There was no appreciable wear in outside diameter in any of the units.

Circumferential deposit of oxide films on piston pin. This is typical of few test fuel units.

tergent, SAE 40. A 100% catalytic cracked No. 4 oil was used, a product from the newly developed Fosteron fields in Dakota and Canada, refined in Casper, Wyo. For comparison purposes, the regular C&NW specification No. 2 fuel oil was used.

Test History

Before starting the test, all engines operating on both test and regular fuels were inspected and found to be normal operating condition. During the test, each engine was examined at three month intervals. Engines in which lacquering was noted, were examined as frequently as one month intervals. These examinations included inspection of lube oil filters and strainers, fuel filters and air filters.

Air box inspections were conducted to determine intake port deposits, appearance of piston crowns, condition of rings, piston skirts and liners, and general engine cleanliness. Significant deposits were found on both test and regular units. More deposits were found on the test engines throughout the tests than on the engines using the regular No. 2 fuel.

Lubricating oil filters were changed semi-monthly. Fuel oil filters (pressure and suction), and carbody and engine intake air filters were changed at monthly intervals.

Engine Modifications

At the beginning of the test, the power pistons in the test fuel engines were changed from $1\frac{1}{32}$ in. to $\frac{3}{8}$ in. in order to compensate for the higher BTU test fuel. Engines using the regular No. 2 fuel were left at $1\frac{1}{32}$ in.

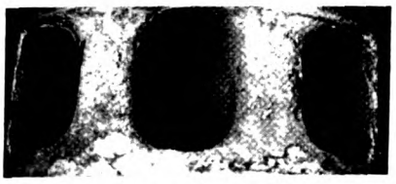
On October 10, 1955, since lacquer deposits were forming at a higher rate on the test engines, changes were made in an attempt to alleviate this condition. On the four test units, the fuel injection timing was changed from 4 deg BTDC to 6 deg BTDC. On two of these units, fuel oil filters were applied to detect any advantages as compared with the other two units. The rate of varnish deposits decreased as a result.

Test Results

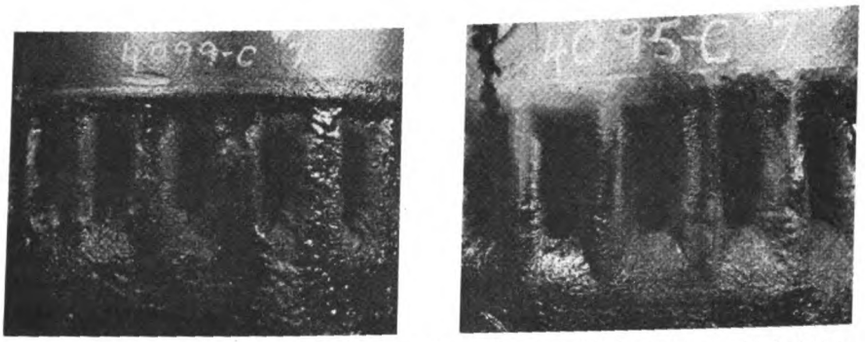
On October 26, 1955, after an engine inspection, it was concluded

Average Properties of Fuel Oils Used for Tests

	Test fuels		
	April 1955 to August 1955	August 1955 to January 1956	Regular fuel
Gravity, deg API	26.3	29.1	35.9
Viscosity, SSU @ 100 deg F	35.4	35.4	33.9
Sulfur, % wt.	1.01	0.95	0.45
Pour point	0	0	0
Flash point	210	210	170
Cetane Number	30	35	49
ASTM distillation, deg F:			
Initial boiling point	468	440	346
10%	478	478	417
90%	606	595	580
End point	650	654	640
BTU per lb	19,302	19,414	19,686
BTU per gal	144,128	142,441	138,550



Light carbon deposits on cylinder head exhaust port. This is typical condition of all units.



Carbon deposits showing about 20% closure of cylinder liner intake ports is a typical condition in test fuel units (left), as compared with regular fuel units (right).

that the inherent unstable nature of the test fuel required a stabilizing additive which was then added to all test fuel used until the end of the test.

Locomotive availability was somewhat affected by the use of the test fuel. In general, however, both the test fuel and the regular fuel locomotives fulfilled their assigned work schedules during the test period.

Piston discoloration and deposits were higher on the test fuel pistons than the regular fuel pistons. Ring groove deposits were heavier on pistons operating on test fuel, with deposits in all cases being carbon deposits. There was an average wear of .001 in. on the outside diameters of the pistons used on the fuel tests.

Top piston ring wear in the test units was greater than the regular units, being .041 in. against .028 in. On the Nos. 2, 3, 4 and 5 rings, the wear was approximately the same in all units, averaging .013 in. There were no broken rings during the test and no evidence of stuck rings. All rings were free at termination of test.

Cylinder liner average wear was greater in the test units, but the difference was small. In general, the lacquer deposits were considerably heavier on the inside bore of the test liners. Actual slight flaking occurred.

Engine Deposits

Deposits on the cylinder liner intake ports averaged considerably heavier on the test units. Piston carrier bushings and thrust washers were normal in appearance and wear was low on all units. Piston pin bushings were normal in appearance on the regular fuel units, with very little wear on any of the units. Several assemblies on the test units showed slight scoring.

Piston pins on all units showed very little wear. Piston pins on the regular units were normal in appearance. However, on the test units, some of them had circumferential deposits of oxide film. All cylinder heads were in normal condition, with very little deposits in valve seat and exhaust port areas. All exhaust valves were normal in appearance and showed slight carbon deposits on shoulders and some lacquer on stems.

No serious injector trouble was experienced during the test. Carbon build-up on the injector tips was approximately the same on all units, with no injector sticking. All racks remained free. No excessive wear was found on parts of injectors using both test and regular fuel.

There was no noticeable difference in the performance of the lubricating oil and fuel oil filters. The test fuel reflected a higher rate of crankcase lubricating oil deterioration, indicated by lube oil changes due to oxidation, additive depletion and increased oil consumption. On the two units using regular fuel, there were two changes made, three due to oxidation and oxidation. Of the four units on test fuel, a total of nine changes were made, three due to oxidation and one to additive depletion. Other reasons included fuel and water leaks.

Summary of General Operation

	Test fuel**	Regular fuel
Duration of test	8.3 mo.	9.0 mo.
Total miles of units	142,240	95,638
Average miles per unit	47,413	47,819
Total gallons fuel used	318,530	———
Average gallons fuel per unit	106,177	———
Gallons consumed per mile	2.24	———
Approx. hours of idle per day	9	9
Approx. hours of load per day	15	15
Average miles per unit, month	5,712	5,313
Avg. fuel consumption (gal per unit month)	12,792	———
Avg. fuel consumption (gal per rated HP month)	8.5	———
Average tonnage per two units	3,600	3,600
Average maximum tonnage	6,500	6,500
Average minimum tonnage	1,900	1,900
Lube oil consumption per unit, gal	1,148	569
Make-up lube oil consumption (gals. per 1000 unit miles)*	13.6	7.4
Number of lube oil changes per unit	2.3	1.0
Number of lube oil filter changes per unit	17	18
Number of locomotives involved	1½	1
Number of units involved	3	2
Number of diesel engines involved	3	2
Number of measured power assemblies involved	6	4

* Excludes oil for lube oil changes.

** Data of three units only account one unit failure during test.

CAR DEPARTMENT'S
'PERFECT SHIPPING' PROBLEM . . .

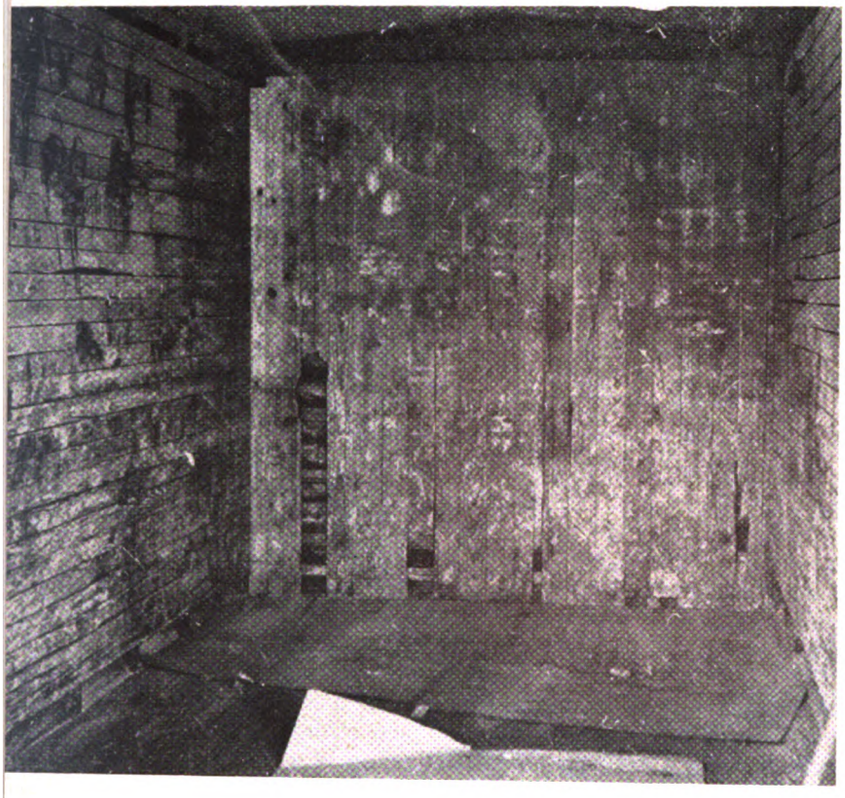
What Should

1 What Is The Upgrading Problem?

2 How Is Upgrading Accomplished?

3 Where And When Is Upgrading Done?

4 What Keeps Cars In 'A' Condition?



Condition and cleanliness of freight car interiors are matters of constant concern for railroads and their customers.

What Is the Upgrading Problem?

Upgrading on some lines does mean making the interiors of closed cars clean and tight for grain and other high-class commodities. However, not all lines feel that upgrading applies only to box cars, and many have much broader programs than the one indicated above. Pertinent comments from some of the more than two dozen railroads queried were the following:

● "Upgrading on our railroad means not only rendering the interiors clean and tight, but putting the entire car generally in first-class condition."

● "For us it means raising the car to the top classification that underframe and general condition dictate. We always go over cars completely—underframes, roofs, trucks and paint as well as interiors."

● "To upgrade a freight car would first require that it be placed in first class condition both inside and outside. This would mean particularly the relining and reflooring of a box car so as to make it suitable for high grade commodity loading. The second step would be to add special equipment such as lading strap anchors and 'DF' loaders to meet special requirements of shippers."

● "Upgrading only applies to conditioning the interiors of cars for highest classification possible without general repairs."

● "The upgrading of closed cars means not only making the interiors clean and tight for a particular commodity, but doing the necessary work to make the car suitable for any and all high grade commodities, and to preclude the necessity of placing the car on a repair or upgrading track before each loading. During times of severe shortages of high-class cars, however, it is expedient to merely do the minimum involved to render the car fit for a particular high-class commodity."

● "To us it generally means making cars suitable for paper loading."

● "Upgrading means more than making closed cars suitable for grain and other high-grade commodities. On our clean-out and light-repair tracks, we may upgrade a 'D' or low class car to a 'C' or better; or a 'C' to an 'A' or 'B' by replacing a small amount of lining or a floor board (any repairs that do not entail a large amount of material or labor). Our heavy repair shops upgrade all closed cars to be 'A' or 'B'. We also paper line cars for handling grain which otherwise would not be suitable."

● "We do not upgrade cars for grain or better. We do upgrade cars for general use."

● "Upgrading involves making cars fit for high-grade commodities by renewing side and end lining when rough or broken, and applying a new floor surface."

● "This could apply to any type of car but is most commonly applied to box or closed cars and involves more than rendering the interiors clean and tight. In Upgrading to haul a higher class commodity, contamination and odors must also be removed."

● "Our upgrading is intended to put cars in condition to handle foodstuffs. It is to upgrade cars from class 'C' to 'A'. Cars are not raised from 'C' to 'B', and

Your Car Upgrading Accomplish?

Could a box car be built that would stay in Class "A" condition permanently? April's "Perfect Shipping" campaign coincides with an annual railroad concern over supplying high grade box cars for movement of seasonal grain crops. However, changes in America's economic and technological patterns have made the demand for "A" cars almost perpetual rather than strictly seasonal.

Our surveys have shown shippers almost evenly split on whether or not railroads are doing an adequate job of supplying suitable cars. Railroad mechanical departments are almost unanimous in rating "upgrading" as a year-round problem; but the methods, materials and scope of these programs vary considerably. A coast-to-coast survey of railroad mechanical department officers answered many important questions, and gives an overall picture of this upgrading problem.

'X' cars are never upgraded but are shopped for complete rebuilding. The upgrading operation takes up to 35 man hours. More labor makes the operation a class repair job."

How Is Upgrading Accomplished?

What Is Done?

Cleaning cars and making their interiors tight and smooth summarizes upgrading on many lines. Some roads report that considerable work is necessary to make doors, sides, ends and roofs water tight. The problem of providing a smooth interior is solved in a number of ways. Nails and splinters must be removed. Holes in sides, ends and floors must be filled. There are several materials other than the traditional lumber which are being used; our survey yielded information on their acceptance. Eliminating contamination is a major job, and several roads admit that sometimes the only solution can be lining replacement. At the same time a number of other methods are suggested.

What Upgrading Materials?

Lumber: At the moment railroads are showing a preference for those materials which have always been used for lining cars—tongue-and-groove and butt lumber. Only one line reported that these are not used for upgrading, and two qualified their use. One complained about the cost of T&G, and the other said that it is difficult to get good quality.

Plywood: Fifteen lines reported that they do use, or have used plywood for upgrading, while thirteen others said they have no experience with this material. Among the 15 users, ten regard it as a standard for upgrading. Other comments include the following:

- "Used in ends of cars for quick upgrading."
- "Used to replace badly damaged lining."
- "Only for repairs to foreign line cars."
- "Economical but subject to theft."
- "Has been used in past, but discontinued because of cost and splintering."

Special Paper Lining: Special paper linings have not been used by twelve of the roads surveyed, and 15 report experiences with these materials. Ten roads use them regularly, and comments from others include the following:

- "Good acceptance for grain cars but not acceptable for paper, sugar or flour due to asphalt binder."
- "Good for one load only."
- "Not mechanically satisfactory."

Plastic Fillers, Paints and Sprays: Among the dozen lines which reported experiences with plastic compounds, six are regular users. Two of the dozen lines which have not tried them rejected the idea because of cost. Comments from users included:

- "Most economical method of upgrading floors for any purpose."
- "Satisfactory for minor patch work. Expensive for extensive patching and only good for one or two loads."

(More on next page)

- "Used on malt loading cars only."
- "More or less temporary repair."

Paper Grain Doors: While not strictly an upgrading operation, this survey took advantage of the occasion to ask about experiences with paper grain doors. Grain doors are usually applied while a car is being upgraded for grain service. Twelve roads use them (ten regularly), and eleven report no experience. Reactions included the following:

- "Not as effective as wooden grain doors. Advantage is their low cost."
- "Paper grain doors on cars received from other lines give some trouble because they bulge against the sliding doors and tear when the doors are opened."

One railroad has upgraded some single-sheathed box cars by spraying interiors with cement and covering the interiors with tempered hardboard. Excellent results are reported. Another reported that the interiors of roofs have been lined with plywood to prevent condensation.

Eliminate Contamination?

One railroad reported that its cleaning tracks are equipped with Vapor "Upgraders." These small electric steam generators are used for both routine cleaning and for elimination of contamination. Washing, steaming and airing all play their parts in eliminating freight car contamination. Used with the hot water and steam are the following materials: deodorants, disinfectants, detergents, chloride of lime, soda ash, Oakite Penetrant, and other cleaning compounds.

One line said that it runs cars "through the washing plant and uses whatever chemicals are necessary to remove the stains and odors." After thorough washing, several lines attempt to seal contaminated areas in the lining by using Cemtex, paint, shellac or varnish. One road reports that it eliminates odors in cars by burning brown sugar in them. When all else fails, it is necessary to strip part or all of the interior and apply new floor and lining. One road reported that it is sometimes necessary to sand blast and red lead the inside of the body after the lining has been removed to eliminate contamination.

Upgrade and Paint?

Differences in the definition of upgrading cause some differences in answers about whether upgrading is always followed by painting. Three roads always do it. Ten roads paint the car if it needs it, or if it has been moved to a back shop for upgrading. Seven lines do not associate exterior painting with upgrading.

Where and When Is Upgrading Done?

Upgrading is a year-round operation on nearly all railroads. The grain roads report that the activity must be intensified during the loading season. Three roads reported that their upgrading operations are strictly seasonal.

The money for upgrading comes from the budget for general car repairs on most railroads. Twenty-four of 28 roads reported that this is the case. Three lines do make "upgrading" appropriations, but generally these are for some items which are additions and betterments, or for work which finally is rated as heavy repairs.

Fourteen lines said that they are unable to estimate the number of cars which will be upgraded during a coming year. One reports that it endeavors to "program the work as much as possible." Five say that they are able to predict the upgrading demand. Pertinent comments include:

- "We can estimate within ten per cent."
- "Cars to be upgraded by general repairs are cov-

The Problem: There Are Not Enough Ca

An Operating Officer Says . . .

"Few commodities will now load in rough-freight box cars. Shippers of lumber, brick, clay, cotton, and many other commodities formerly content with rough-freight box cars will no longer load them. They demand Class 'A' cars, and nothing less than 'B' will satisfy them.

"From some checks made of all empty box cars passing our terminals, we found the break to be about 55 per cent rough freight, 33 per cent Class 'B' and 12 per cent Class 'A'. Of course, these were not all our cars; most of them were of foreign ownership—the bulk of our cars being on other railroads. When it is considered that about 80 per cent of the lading offered today demands Class 'A' and 'B' cars, the disproportion between loading offered and car available is clearly evident.

"The tendency is for these low grade, unneeded cars to drift uselessly back and forth, and from road to road . . . The business could be moved with a much smaller fleet of cars in good repair. Expensive cross hauling, yardings with wasted switching, could be wiped out. The problem of keeping track of and supplying empties for loading would be greatly simplified. . . .

"Bad order ratio is meaningless as applied to box cars, because that ratio might be as low as one per cent but all the cars might be rough freight, providing very few loadable box cars. A better and certainly a more revealing ratio for box cars might be the rough-freight ratio."

D. W. Brosnan
Vice President—Operations
Southern Railway
RSPA Meeting, November, 1954

"Total result is retarded by carriers whose programs are inadequate, fluctuating . . ."

ered under an expenditure authorized by the vice president's office on the basis of a proposed yearly program covering all series of cars estimated to need general shopping. Cars upgraded by paper lining, or by sweeping and washing are upgraded, as required, upon advice from the transportation office."

● "Estimates made in advance have not been a good guide on what will be spent on an upgrading program. Demand for high-class cars and the availability of cars suitable for upgrading fluctuates too much from time to time and from point to point to make a budget allowance effective."

Eleven railroads report that all of their car repair tracks do upgrading work. Nine say that certain of their repair tracks and the back shops perform this work. Seven consider upgrading as a back shop operation. Most railroads assign upgrading to all car repair faces when the work is available, and four report that they make the work the assignment of special gangs.

What Keeps Cars In 'A' Condition?

Existing Cars: Eight of the railroads report that they have no regular program for making changes in existing equipment to keep it in "A" condition longer. Seven lines have programs for strengthening floors on existing cars. One line puts in "double floors and floor reinforcement." Another makes the recent AAR order on new box car floors applicable to all its cars as they are shopped. This calls for additional stringers and the use of 2⅜-in. decking. Five roads make considerable use of nailable steel flooring, and threshold and floor protector plates at doorways when cars are rebuilt.

Lading anchors are a regular addition to all or some of the rebuilt box cars on eight roads. Six lines report regular programs of adding "DF" loaders, and two apply some "compartmentizers." One line reports that it is substituting "1½-in. end lining for $2\frac{5}{32}$-in. end lining, and on a great many cars we install an interlaced, dovetailed, combination steel and wood end lining."

Changes in original design are probably well summarized by one road which reports that "cars are generally repaired in kind except where deficiencies in original construction are noted, or where improved design warrants a change which will reduce future maintenance, or improvement is justified from an economic standpoint." One road said that "18-yr old box cars are getting new sides with 9-ft door openings and new roofs." Another said "several thousand box cars are being equipped, when shopped, with a stronger doorway reinforcement due to structural deficiency at that point." Still another said that "side sills and door post connections are strengthened."

Eight railroads are already adding journal lubricators to cars as they are shopped. Two of the lines reporting have been applying roller bearings to some existing cars. Nine lines add ride control to trucks when cars are shopped for heavy repairs.

The money that will be expended on a partially depreciated car for additions and betterments will not be dictated by the book value of the car on most lines. This was well summarized by one road's report that "the extent of additions and betterments to be applied to a partially depreciated car is not based on cost. If we consider a car, such a box car, to be of modern design even though partially depreciated, latest improvements such as lading strap anchors and auto loader devices are installed because this car, after having received heavy repairs, will be placed in first class condition with at least ten years of expected life."

Another line said that "applications of specialized loading equipment, or additions and betterments are authorized only on the results of studies indicating that a fair return will be realized on the investment." Still

Cars in 'A' Condition Today

And A Shipper Agrees, Says . . .

"We conducted a nationwide poll in 1955 on the suitability of box cars for loading edible products. This poll shows that, of the cars furnished for loading edible products, 61.6 per cent were substandard with either rough interiors or protruding nails; or they were contaminated, infested, or otherwise unfit for loading.

"Since that time, the Southwest Shippers Advisory Board has conducted quarterly polls and there is no substantial improvement in this condition. In the Southwest, 53.3 per cent of the cars furnished for loading were unfit in 1955, and the figures since that time have remained consistently the same or worse.

"The basic fault is the lack of a uniform system of carding and grading which permits the abuse of a carrier's equipment after which there must be an expensive upgrading program. This could be eliminated, or greatly minimized, if the carriers would adopt a uniform system.

"The AAR did make an attempt to establish a uniform system of carding and grading, issuing their Circular T 25, dated December 17, 1937 and revised 18 years later,—July 8, 1955—Circular T 251. But their efforts were inadequate in the very beginning and practically none of the carriers adhere to the so called uniform system recommended by the AAR. Each has his own individual system. The result is that none of the carriers speak the same language."

R. R. Rabon
Traffic Manager
Campbell Taggart Associated Bakeries
February, 1957

Here Is What Your Customers Think of Your Cars

Shippers Split On Upgrading Results

Your freight car upgrading meets the requirements of nearly half of the shippers questioned in a recent ballot conducted by our companion publication, Railway Freight Traffic. This group's opinions were that upgrading has helped to improve the overall condition of the freight car fleet, that in most cases enough cars are being upgraded, and that the work being done during this upgrading has usually been adequate.

Dissatisfied shippers represented a slim majority among those voting. Many of the points raised by this group are not items covered by the typical car upgrading. These include greater structural strength, wider doors, and other major changes which must be incorporated when cars are built new, rebuilt, or when they receive the heaviest of repairs. Several shippers called for improvement in riding qualities.

Below are some of the comments which accompanied the ballots. Those who expressed dissatisfaction with present upgrading offered the largest number of suggestions, and most of these comments are necessarily theirs.

- "We need better banding and bracing anchors; steel and wood in preference to plywood for inside siding; and better flooring—perforated steel and wood."
- "Need is for more 50 ft box cars with minimum door opening of 10 ft. Car lining of plywood is very good."
- "Upgrading is not adequate for canned goods. The primary source of damage is bowed end walls. Replacing or repairing wood car lining only is not effective. To be effective, steel framing on end walls should be squared and straightened. Few carriers do this in their upgrading programs."
- "We find hardware on doors either broken or inoperative making cars difficult to open. Suggest using steel flooring plates on flat cars to protect flooring."
- "Certain individual railroads are doing an outstanding job in upgrading their equipment, replacing outmoded equipment, and providing good all-purpose cars. Total result is retarded by those carriers whose programs are inadequate, fluctuating and depending on other carriers to furnish a car supply."
- "Improved draft gears and trucks prevent damage and make satisfied customers."
- "Satisfactory heavy repairs but the railroads need more uniform program of upgrading cars. Poor floors and bulged ends are our biggest problems. Plywood lining and new floors suit our product best. Steel flooring would do, but not scattered flooring plates."
- "We find decks of gondolas in poor shape. Many box cars which are furnished to us for Class 'A' cars have been going bad because of poor running gear."
- "While we use very few box cars for shipping beer, we are interested in the upgrading of refrigerator cars by installation of wider doors, perforated steel floors, and movable bulkheads."
- "Upgrading has been satisfactory but the number of such cars has not been adequate to meet the demand."
- "Most gondolas are being repaired with steel floors and sides replacing original wood floors and sides. This forces shippers of heavy machinery to load flats that are very hard to get."
- "Too many flat cars have poor decks."
- "We believe lumber or heavy plywood to be the best lining materials. Lading anchors or adjustable gates would serve to tie down loads and avoid shifting of lading."
- "We continue to receive reports from our factories of poor cars. These reports are not so numerous as they were 12 to 18 months ago."
- "Metal nailable floors are very desirable. Favor, and use whenever available, the 'DF' or GAEX cars and believe that there should be more attention given to this type. It is possible, we have been told, to convert regular box cars to this type of car."
- "Plywood or some other material to seal the sides, and steel floors, serves our use best."
- "Plywood sides are the best improvement, but wooden floors are in bad condition. Therefore, steel flooring is sought."
- "Prefer, and get in most instances, plywood lined box cars for our type of commodity."
- "We are vitally interested in the efforts of railroads to upgrade freight cars. The railroads are making good progress but upgrading is not the sole answer to the prevention of damage to lading . . . we are convinced this enormous [loss and damage] figure can be reduced by 75 per cent if railroads will embark upon a program to build general all-purpose box cars that will eliminate vertical oscillation and longitudinal impact shocks."

"No program will effectively keep cars in 'A' condition permanently without incurring costs too excessive to be justified."

another stated, "Need dictates the cost."

New Cars: Most roads when ordering new cars attempt to correct deficiencies which have become apparent in previous designs. One road's approach is "a large car shop now under construction to maintain regular cycle repair programs to keep equipment in 'A' condition permanently." Another suggested that an approach to the permanent "A" class car would be "heavier end sections, stronger doors, thicker flooring, ride control trucks, lading anchors and journal lubricators." Said another, "We are building our new cars stronger in every way such as heavier side and center sills, plenty of floor supports, stronger ends, rubber draft gears, steel wheels, and tightlock couplers."

Some roads say that they can do nothing to make cars which will stay in "A" condition. Said one, "We have found no program which will keep our cars in 'A' condition permanently without incurring costs which we consider too excessive to be justified." Another states that there is nothing more that needs to be done for cars intended for grain, flour and feed.

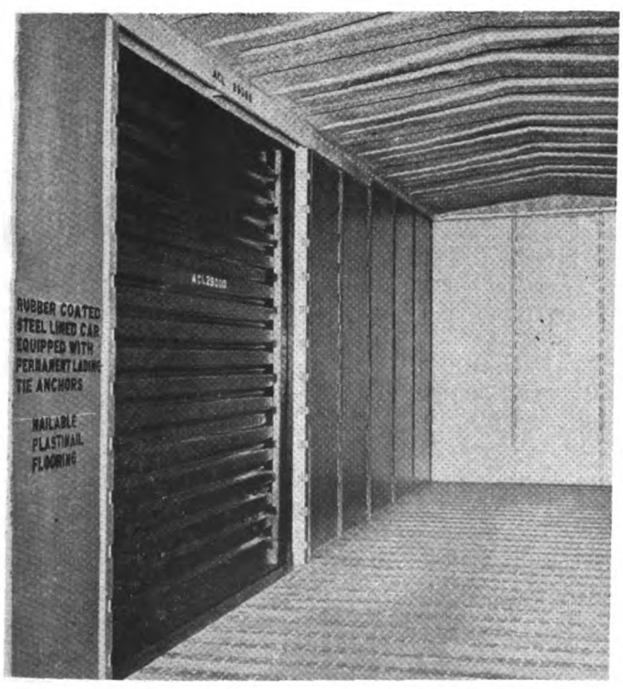
One line said "With the widespread misuse of high-grade equipment today, we do not know of any method which will keep a car in 'A' condition permanently. However, a heavier end lining and decking, nailable steel flooring, lading anchors, door post protection and other features tend to keep box cars in 'A' condition for a considerably longer period."

The entire problem was summarized by one Midwestern line which said, "To keep new cars in 'A' condition longer or permanently is a constant problem that requires the attention of all people in the operating, transportation and mechanical departments."

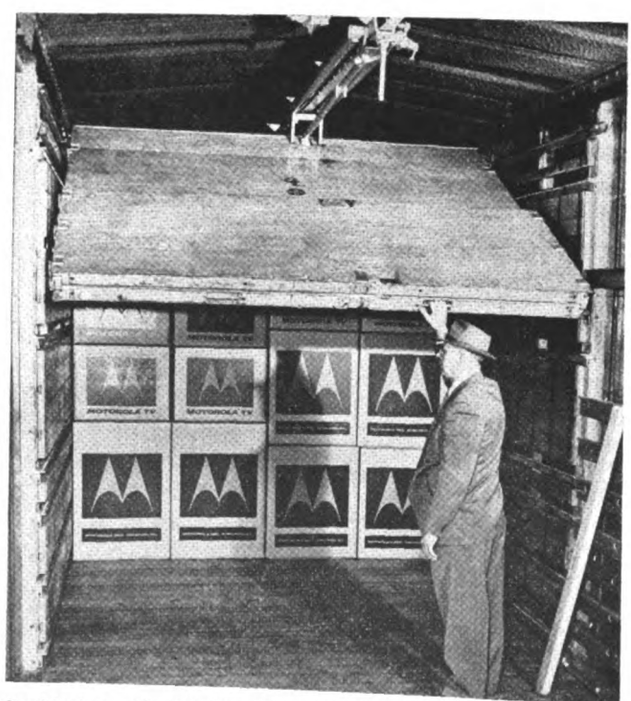
For a review of upgrading equipment and materials described during the past year both in Railway Locomotives and Cars and Railway Age, see pages 99-103 of this issue. . . . Editor.

Coast-To-Coast Survey

Information was provided by the mechanical officers of the following railroads: Atlantic Coast Line; Atchison, Topeka & Santa Fe; Bangor & Aroostook; Bessemer & Lake Erie; Boston & Maine; Central of New Jersey; Charleston & Western Carolina; Chesapeake & Ohio; Chicago & Eastern Illinois; Chicago & North Western; Delaware & Hudson; Delaware, Lackawanna & Western; Erie; Gulf, Mobile & Ohio; Illinois Central; Illinois Terminal; Lehigh & New England; Lehigh Valley; Milwaukee; Minneapolis & St. Louis; Missouri Pacific; New York Central; Norfolk & Western; Northern Pacific; Seaboard Air Line; Soo Line; Southern Pacific; Spokane, Portland & Seattle, Texas & Pacific; Union Pacific; Virginian, Wabash; and Western Pacific.



Steel-lined box cars of Atlantic Coast Line have metal lining panels welded and locked in place. Bonded to lower surface of each panel is Neoprene sheet 36-in. high. Walls, ends and roof are coated with aluminum-colored Neoprene paint. Car has lading anchors and Plastinail floor. Sliver- and vermin-proof interior arrangement serves to strengthen car structure.



Partitioning and load-locking Evans "Quick Loader", recently developed, is typical of devices being applied to new and existing cars to protect lading and at the same time make it unnecessary to damage the car interiors while securing these loads. Many railroads are showing increased interest in lading anchors, "DF" loaders and similar devices for their existing cars.

SP Specifies the 'What' and 'How'

By C. F. JURSCH*
General Inspector
Research & Mechanical Standards
Southern Pacific Company
San Francisco, California

With the rapid change-over from steam to diesel power, many new problems have arisen. Practices which had long been used with steam power have not been effective on diesels. The materials first used as cleaners on the diesel locomotive were those which had been used on steam power. Unsatisfactory results led to poor housekeeping, affecting the overall appearance of diesel locomotives as well as contributing to fire hazards and ineffective preventive maintenance. Cleaning materials and methods have had to be improved and standardized.

Cleaning materials originally were purchased on a competitive basis from a number of manufacturers. The use of alternate brand names and manufacturer's code numbers became increasingly confusing to Southern Pacific maintenance forces. To eliminate the confusion, a Southern Pacific reference number was assigned for each type of cleaning material used. This reference number eventually became the Southern Pacific specification number.

Specifications now have been issued for most standard cleaning materials. Prior to writing a specification for each individual material, manufacturers were contacted and asked to submit samples of their materials which they recommended for the specific job. These samples were then sent to the SP laboratory where they were examined and subjected to laboratory tests and analysis. From results of laboratory tests, two or three of the materials which were considered to be the best suited for the particular job were further tested in the field. Results of field tests were correlated with laboratory tests and a specification was written. Specifications have been developed for a dozen different classifications of cleaning materials.

This system inaugurated a simplified practice for purchase and identification of cleaning materials. It has been of considerable aid to storekeepers in handling and segregating the various materials as well as eliminating confusion and misuse by shop forces. Cleaners furnished in drums have the entire drum or at least a center band painted in a distinctive color before applying the number and name of the cleaner. All other stenciling such as the order number, date, and manufacturer's code number is confined to the head of the drum. The only marking or labeling permited on the cylindrical surface of any drum is the approved Southern Pacific specification number and designation.

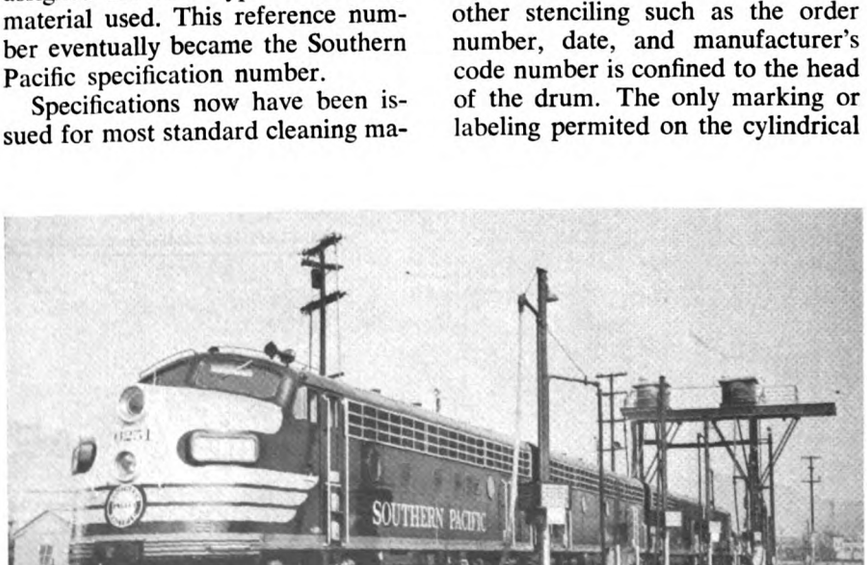
The next step in standardization was to issue a circular classifying cleaners and listing the uses to which they might be put. This circular shows the specification numbers and name, drum color, type of material, instructions for mixing and use, safety precautions to be followed, normal solution strength, pH of solution and authorized use for each material. These instructions are posted at all locations where cleaning operations are performed, and have been very helpful in preventing waste, controlling solution strengths, preventing misuse of materials, and giving ready reference to the necessary safety precautions to be followed when mixing or applying.

Standardized Diesel Cleaning

Having developed suitable cleaning materials it was also necessary to standardize the methods and equipment required to do the diesel cleaning work with the least amount of hand labor so costs would be kept to a minimum. The cleaning program was divided into three main phases:

(1) Exterior cleaning
(2) Interior cleaning
(3) Diesel engine cleaning

For maintenance cleaning, the exterior sides of the diesels are washed with mild alkaline cleaner in concentration of 4 oz per gal. of water. Mechanical washers are used on the road locomotives after cleaning solution is sprayed on the sides, brushed and rinsed. Switchers are cleaned by hand. A specially designed ASME pressure tank, mounted on a hand truck and equipped with an air pressure regulator, safety valve, hose and nozzle with valve and spray tip is used to apply the cleaning solution which is followed by hand brushing and complete rinsing. Instructions have been issued to avoid spraying cleaning solution on panel type car body air filters, to prevent removal of oil from the filters.



SP's locomotive cleaning has been standardized and is done when units reach terminals such as Los Angeles.

*Presented to the American Society for Testing Materials at Los Angeles, Cal.

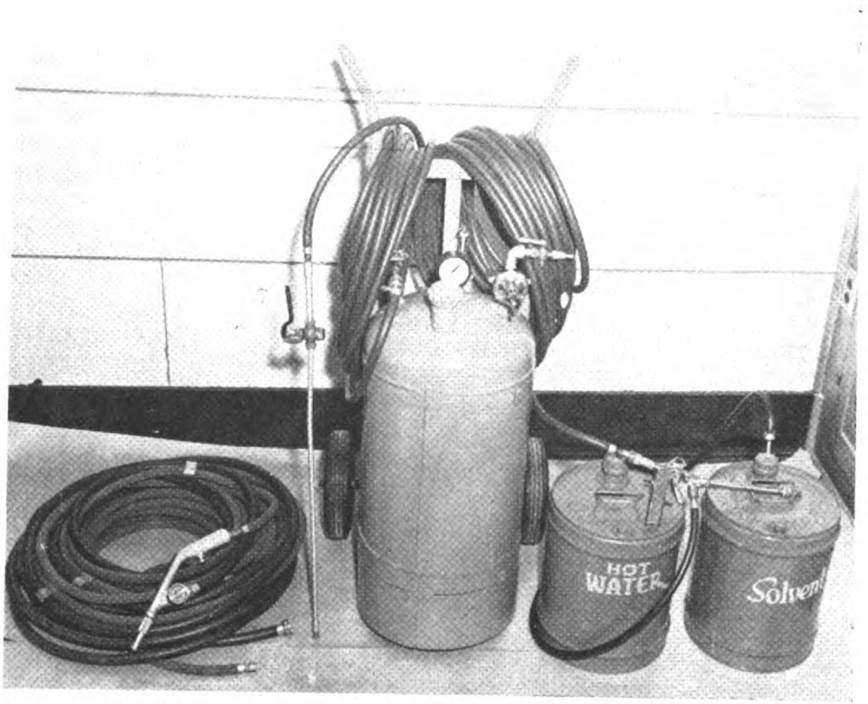
# of Its Diesel Locomotive Cleaning

Nose and windshields are hand cleaned using the mild alkaline solution applied by spray, scrubbed thoroughly with car cleaner brushes and rinsed immediately with fountain rinse brushes. Roofs are also cleaned by this method.

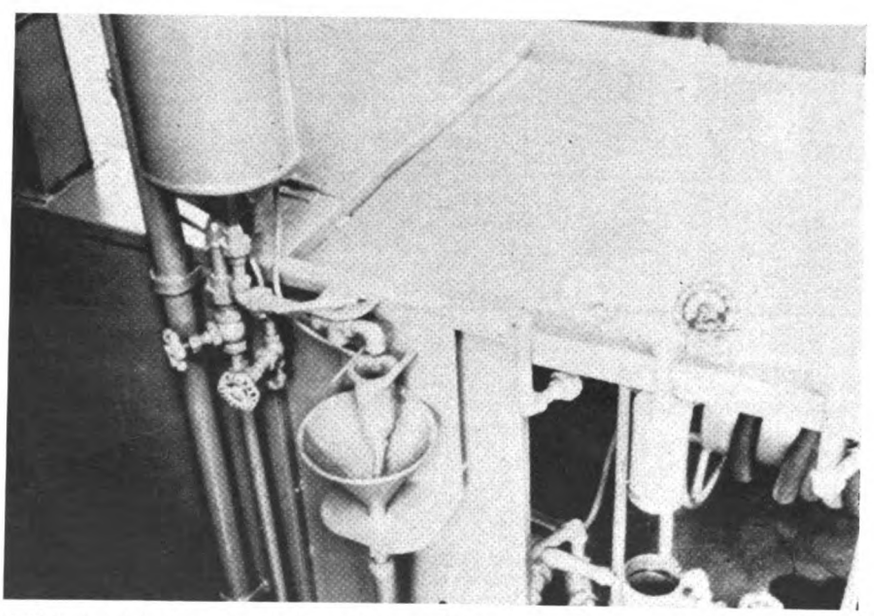
Trucks, underframe and tanks are cleaned by first removing accumulations of paper and weeds. Surfaces are then sprayed with the ready-mixed solvent type cleaner containing an emulsifier. After cleaner is applied, the solution is allowed to soak for at least 10 min before parts are thoroughly rinsed with a sharp spray of water.

Exterior maintenance cleaning of all diesel road locomotives, including sides, nose, windshields, trucks, underframe and tanks is done upon each arrival at the home terminal. Diesel switchers and road switchers are given maintenance cleaning at each regular monthly inspection and more often if operating conditions necessitate. It is not always possible to clean roofs upon each arrival at the home terminal, but roofs are cleaned as frequently as necessary to maintain the desired appearance.

When diesel locomotives require heavy-duty cleaning, the same procedure is followed as has been set up for maintenance cleaning except for roofs and trucks. Roofs are sprayed with the SP's ready-mixed solvent type cleaner and scrubbed with short bristle brushes after soaking for at least 10 min. They are then rinsed with a sharp spray of water. The trucks, underframe and tanks are cleaned in the same manner specified for maintenance cleaning except that the application of solvent type cleaner is followed with steam cleaning, using a solution of alkaline steam cleaner applied by a steam gun. Where available, chemical steam cleaning machines are used for heavy-duty truck and tank cleaning.



Cleaning tools include portable pressure tank with spray guns, hoses, valves and pressure gauge.



Cold tank solution cleaning of sintered bronze filters is followed by rinsing (right) and flow rating (left).

Interior Cleaning

Heavy-duty exterior cleaning is performed as frequently as service conditions necessitate on all types of diesel locomotives. In order to obtain the best cleaning results and to prevent soiling cleaned surfaces, sides and nose of locomotive should be cleaned after roof and truck cleaning has been completed.

The Southern Pacific has standardized on the following equipment for use at all locations where interior cleaning is performed:

(1) ASME code portable pressure tank, complete with spray gun, hoses, valves and pressure gauge mounted on

hand truck equipped with two 10-in. rubber tired wheels.

(2) Washing gun complete with hose and connections.

(3) Air solution syphon gun complete with hose and connections.

(4) Hot water can and solution can.

(5) Water pick-up type vacuum cleaner.

(6) Brooms, mops and wringer pail.

(7) Exhaust fan for mounting in side doorway of units.

Interior maintenance cleaning is performed on diesel locomotives upon each arrival at the home terminal. Cabs are cleaned in the following manner. First, floors are swept. Walls, ceiling, doors, windows, fixtures and exposed surfaces are washed using mild alkaline cleaner applied with damp rag wrung out in the solution. Surfaces are rubbed until dirt is loosened, then wiped dry with another clean cloth. Floors are then mopped with the same solution.

The engine room walls, doors and ceiling, and the engine block, piping, floors, cabinets, fixtures, auxiliaries and other exposed parts are cleaned with the emulsion cleaner, mixed 1 part cleaner to 5 parts water and

These Are the SP Cleaning Materials

MATERIAL	AUTHORIZED USES	MIXING AND USE	PRECAUTIONS
Exterior Cleaner for Passenger Cars Granular acid with rinsing agent and inhibitor pH of Solution: 1.5 SP Color Code: White SP Specification: SP-225	1. Cleaning exterior of passenger train cars. 2. Cleaning radiators.	Normal solution strength: Maintenance cleaning—3 oz per gal. of warm water Periodical cleaning—8 oz (max.) per gal. of warm water Mixing and use: Add cleaner to warm water (not more than 130-deg F) and stir until completely dissolved. Apply by spray or brush.	Wear rubber gloves, approved respirator and goggles if exposed to dust when mixing. Wear rubber gloves and face shield when applying. Avoid contact with skin and eyes.
Heavy Duty Hot Tank Cleaner-Caustic Type Granular Caustic Alkali pH of Solution: 14.0 SP Color Code: Green SP Specification: SP-233	1. Hot tank cleaning and degreasing of equipment parts made of steel or iron only. 2. Cleaning panel type air filters from locomotives and cars. 3. Cleaning interior of steam locomotive tender oil tanks. 4. Cleaning tank car interiors where specified.	Normal solution strength: 4 to 8 oz per gal. hot water Mixing and use: Add cleaner to water at 180-deg F with constant stirring to avoid violent spattering. Under no circumstances pour water on cleaner as violent boiling and spattering of hot caustic solution will result. Immerse parts to be cleaned in boiling solution and hose rinse with hot water or steam. Cleaner is corrosive to aluminum, tin, lead, zinc and alloys containing these metals (such as bearing lining).	Contains caustic soda. Burns skin and eyes. Avoid contact with body or clothing. Observe safety precautions. Wear close-fitting cup type goggles, rubber gloves, apron and boots. If working in dust or mist from cleaner, wear respirator of approved type.
Hot Tank Cleaner for Aluminum Parts Alkaline powder with inhibitor pH of Solution: 12.5 SP Color Code: Gray SP Specification: SP-234	1. Hot tank cleaning and carbon removal from aluminum pistons and other aluminum parts except those containing lining metals.	Normal solution strength: 4 to 8 oz per gal. hot water Mixing and use: Add cleaner to water at 180-deg F with constant stirring until completely dissolved. Immerse parts to be cleaned and hose rinse with water and brush with swab after removal. Dry with compressed air. Not safe on part containing lining metals.	Contains caustic soda. Burns skin and eyes. Avoid contact with body or clothing. Observe safety precautions. Wear close-fitting cup type goggles, rubber gloves, apron and boots. If working in dust or mist from cleaner wear respirator of approved type.
Mild Alkaline Cleaner Mild alkaline detergent powder with solvent pH of Solution: 9.5 SP Color Code: Red SP Specification: SP-235	1. Cleaning exterior of diesel locomotives. 2. Cleaning exterior of passenger train cars for removal of oil deposits and maintenance cleaning where specified. 3. Cleaning interior enameled surface in cab and engine room of diesel locomotives.	Normal solution strength: 4 oz max per gal. warm water. Mixing and use: Mix with warm water and apply with brush or spray. Agitate, if necessary. Follow with clean water rinse.	Wear rubber gloves and face shield when applying.

applied by spray. Where necessary, solution on surfaces is agitated with cloth, sponge or brush while still wet and then flushed off with water using air-water washing gun adjusted for minimum amount of water for complete removal of solution and deposits. After completing this cleaning operation, excess water and removed deposits are picked up with vacuum cleaner followed by thorough mopping of floor. Switchers and road switchers have necessary maintenance cleaning performed daily on cabs and windows. Switcher engine room cleaning is done at regular monthly inspections.

Special cleaning is often necessary around engine ends, oil filter, compressor, body frame members, and on the engine room floor and deck where heavy accumulations of oily deposits have collected. The ready mixed solvent cleaner with emulsifier is applied with spray gun connected to portable pressure tank. Before applying the cleaner, covers and other suitable protectors are placed on blower intakes, generator, cabinet doors and around the compressor drive shaft housing to prevent entry of cleaning solution. After cleaner has been applied, sur-

MATERIAL	AUTHORIZED USES	MIXING AND USE	PRECAUTIONS
Type A With Corn Meal Scrubbing Agent TYPE B—HIGH GRADE TOILET SOAP AND BORAX pH of Solution: 9.0-9.8 SP Color Code: None SP Specification: SP-301	1. Hand cleaning.	Mixing and use: For use in dispensers in shop washrooms, and at other locations where installed.	None
Locomotive Cleaner Solvent Type Dark Brown liquid pH of Solution: None SP Color Code: Yellow SP Specification: SP-236	1. Cleaning of diesel engine top deck, air box and crankcase. 2. Maintenance cleaning of truck underframe and tanks under diesel locomotives. 3. Heavy duty cleaning exterior diesel locomotives. 4. Cleaning steam locomotives and tenders prior to shopping. 5. Maintenance cleaning of steam locomotives, including cabs, jackets and tenders.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Diesel Engine Top Deck, Air Box and Crankcase Apply by spray using portable tank with 1/8 in. Vee Jet Nozzle 1506. Air pressure 40 psi. Flush all parts with SP-255 rinsing oil using portable tank with 1/8 in. Vee Jet Nozzle 1506. Air pressure 80 psi. Exterior Steam Locomotives, and Diesel Locomotive Trucks, Underframe and Tanks—Apply by spray using portable tank with 1/8 in. Vee Jet Nozzle 5010. Air pressure 40 psi. Follow with water rinse using sharp water jet.	Diesel Engine Top Deck, Air Box and Crankcase—Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame. Exterior Work — Wear plastic face shield and rubber gloves. Avoid excessive formation of vapors.
Electrical Parts Cleaner Liquid Solvent pH of Solution: None SP Color Code: Aluminum SP Specification: SP-250	1. Cleaning electrical equipment on diesel locomotives and similar purposes.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Apply by spray with rinsing action on large parts using portable tank with 1/8 in. Vee Jet Nozzle 1506. Brush on small parts. Blow thoroughly with air.	Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame or electric arc. Shut off engine during cleaning operation. Open all circuits before cleaning. Avoid excessive formation of vapors.
Emulsion Degreaser Light Brown Liquid pH of Solution: 9.5 SP Color Code: Brown SP Specification: SP-300	1. For cleaning exterior diesel locomotives. 2. For cleaning interior diesel locomotives.	Normal solution strength: Exterior diesel locomotives: Maintenance cleaning — 1 part concentrate to 25 parts water. Heavy duty cleaning — 1 part concentrate to 10 parts water. Interior diesel locomotives: Maintenance cleaning — 1 part concentrate to 10 parts water. Heavy duty cleaning — 1 part concentrate to 5 parts water. Mixing and use: Mix with cold or warm water. Apply by spray or brush. Follow with clean water rinse.	Wear rubber gloves and face shield when applying.

Table Continued on page 61

Colors and stencilling for cleaning compound drums are specified by the Southern Pacific.

faces are allowed to soak for about 10 min and then flushed off with water using an air-water washing gun. Careful adjustment of washing gun is necessary at all times to avoid flooding the engine room with water. Cleaning solutions and water must be kept away from electrical equipment.

Electrical Cleaning

For cleaning electrical equipment, electrical parts cleaner is used. The cleaner is applied by jet spray, wiping or immersion depending on the type and location of equipment to be cleaned. No special rinsing, flushing or special removal methods are required except the use of an air blast to facilitate drying. This material when applied in the normal manner of cleaning, will not damage or reduce the electrical insulating value of Glyptal varnish, phenolic varnish, mica, rubber, varnished cambric or sealing compounds.

A special exhaust fan, designed to fit side doorways of diesel units is used during cleaning operations to draw out fumes from cleaning process and provide adequate ventilation. The vapor degreaser method is also used for cleaning traction motors and generators when machines are disassembled at time of general overhaul. The degreasing solvent used is known as trichloroethylene.

Engine Cleaning

Standardized procedures set up for diesel engine cleaning have been based on cleaning General Motors 567 engines, but can be adapted to other types with modifications. Diesel engine cleaning is divided into two classifications:

(1) Cleaning at time of oil change.
(2) Heavy duty cleaning at time of overhaul.

After crankcase has been drained of oil for oil change, cylinder head covers, air box hand hole covers, and oil pan hand hole covers are removed. Entire top deck, including cylinder heads, camshafts, rocker arms and other parts are sprayed with our ready-mixed solvent type cleaner by means of spray gun connected to portable pressure tank. Safety precautions must be observed to avoid the formation of vapors and the possibility of fire or explosion.

Spraying is commenced at front end of top deck continuing to rear end, then from rear end to front end on opposite side of the engine. On return to starting point, the spray is then directed through crankcase hand holes in same manner as top decks were sprayed. This cleaning operation is repeated two or three times if necessary to loosen sludge and deposits. Airboxes are not sprayed. After deposits are loosened satisfactorily, all parts being cleaned are flushed off with a high-flash petroleum distillate using the same equipment except a flushing nozzle is substituted for the spray nozzle. The same sequence is followed in flushing as in applying the solvent. Excess solvent is removed from drain trough and crankcase with a syphon gun and surfaces are wiped with wiping rags to remove any traces of sludge or deposits remaining from flushing operation. Air boxes are hand wiped, using rags.

Heavy duty cleaning at time of overhaul is performed, after cylinder assemblies are removed, in the same manner as at time of oil change. Prior to spraying the surfaces with cleaning solvent, all heavy deposits of sludge and carbon are removed as far as possible with putty knives. The air boxes also are sprayed and cleaned with the solvent type of cleaner.

When engines are removed from locomotive for complete overhaul, crankcase liners, heads and valves are cleaned in heavy duty alkaline hot tank solutions followed by thorough rinsing with syphon steam guns or steam cleaning machines. Internal diesel engine parts such as connecting rods, bearings, pins and bushings are cleaned in the cold tank cleaner solvent type. Aluminum pistons and parts are cleaned in an inhibited hot alkaline cleaner followed by complete and thorough rinsing.

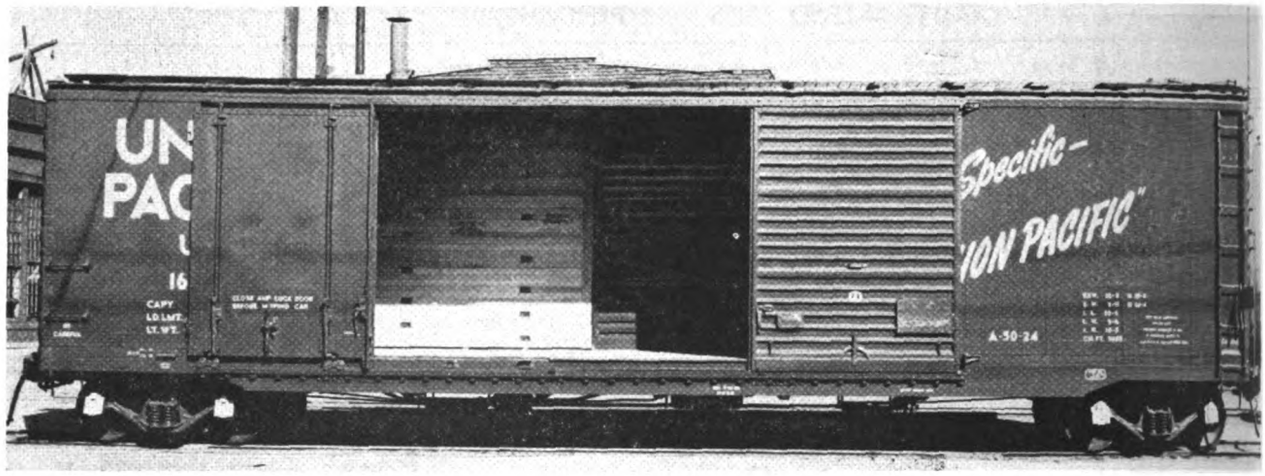
A fast and thorough method for cleaning brush holders, contractors, reversers, cam switches and other electrical parts made primarily from brass and copper has been standardized. This employs the SP-291 cold tank cleaner which contains a brightening agent. The equipment consists of a covered tank for suspension of the parts to be cleaned. Perforated air lines are located in the bottom of the tank from which air is emitted to produce a turbulent agitation of the liquid. When parts are removed from the tank they are rinsed with an air-water washing gun and blown dry with compressed air. After cleaning, the brass and copper portions of the assemblies have a very bright appearance with all deposits of carbon and grease removed.

Methods Supervised

At all points where cleaning is performed, cleaning operations are followed up and supervised from time to time by members of the engineer of research and mechanical standards staff. This practice of follow-up and supervision results in uniform cleaning procedures at all terminals.

Many benefits have been realized by good housekeeping on diesel locomotives. Fire hazards from excessive accumulations of oil and grease on exposed surfaces are reduced. Better and more thorough inspection and maintenance is possible. The possibility of failures from dirty operating parts is reduced. All of these contribute to improved performance from diesel motive power.

MATERIAL	AUTHORIZED USES	PRECAUTIONS	MIXING AND USE
Scale Remover—Acid Type Liquid inhibited acid (furnished in carboys) pH of Solution: None SP Color Code: None SP Specification: SP-238	1. Removing scale from interior of coils in steam generators on diesel locomotives. 2. Cleaning engine radiators and cooling systems on air conditioning units. 3. Heavy cleaning of toilet bowls and dental bowls.	Normal solution strength: Scale Removing—1 part per 3 parts of water or as required. Cleaning purposes—1 part per 10 parts of water or as required. Mixing and use: Circulate with pump for removing scale in steam generator coils on diesels and in air conditioning engines. Apply with brush for hand cleaning. Flush thoroughly.	Inhibited acid. Avoid contact with skin. Wear goggles, rubber gloves and apron. Observe all safety precautions.
Rinsing Oil Liquid Solvent pH of Solution: None SP Color Code: Dark Blue SP Specification: SP-255	1. Flushing interior of diesel engines at time of oil change or overhaul.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Apply by spray with rinsing action after using cleaner SP-236. Use portable tank with 1/8 in. Vee Jet Nozzle 1506.	Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame or electric arc. Avoid excessive formation or vapors.
Cold Tank Cleaner Solvent Type Dark Brown Liquid pH of Solution: None SP Color Code: Gray SP Specification: SP-291	1. Cleaning of internal diesel engine parts. Do not use for removal of hard carbon or water scale.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Cleaner is used full strength in air agitated tank. Immerse parts to be cleaned in solution and rinse with cold or warm water. Use air water gun. Blow dry with air. Dip parts as soon as possible in water-replacing, rust-preventive oil to prevent corrosion.	Wear goggles or face shield, rubber gloves, apron.
Liquid Detergent Clear Liquid pH of Solution: 8.2 SP Color Code: Black SP Specification: SP-297	1. Cleaning complete interiors of passenger cars. 2. Cleaning upholstery, rugs, portieres, window shades and drapes.	Normal solution strength: Interior passenger cars—Painted surfaces, stainless steel, leather, plastic: 2 oz concentrate to 1 gal. water. Rugs, upholstery, drapes, window shades: 8 oz concentrate to 1 gal. water. For heavier cleaning, proportion determined by degree of soil on surfaces to be cleaned. Mixing and use: Mix concentrate with water as specified. Apply with sponge, cloth, brush or spray. Follow with clean water rinse. When used on interior of passenger cars, wipe surface dry.	None
Steam Cleaner—Alkaline Type Alkaline Powder pH of Solution: 12.5 SP Color Code: Light Blue SP Specification: SP-237	1. Maintenance steam cleaning of trucks and running gear, tanks, and underframe on steam and diesel locomotives and passenger train cars, where specified. 2. Maintenance steam cleaning of connecting rods, crossheads, and motion work on steam locomotives where alkaline cleaner is specified. 3. Cleaning exterior of passenger train cars prior to repainting Class 7 repairs. 4. Cleaning floor racks in car equipment. 5. Cleaning exterior of box cars, not blasted, prior to repainting.	Normal solution strength: 4 oz max per gal. hot water. Mixing and use: Mix cleaner in hot water. Apply by brush spray, steam gun or chemical steam cleaning machine. Brush if necessary. Follow with water rinse using sharp water jet.	Wear rubber gloves, approved respirator and goggles if exposed to dust when mixing. Wear rubber gloves and face shield when applying. Avoid contact with skin and eyes.



Plug doors were applied to this Union Pacific 50-ft box car; 500 more cars with this door arrangement are being built by the UP.

Plug-Door: Solution For All-Purpose Box Car

GN, SP and UP are all working with design recently given nod by AAR car committee.

Plug door operating mechanism is the same used on late refrigerator cars. SP has on order 2,900 cars of this type.

A general purpose 50-ft box car, having two wide, staggered openings, one on each side, offers one solution to the growing demand for a universal car to handle not only mechanized and palletized loading, but also bulk shipments, without additional expense.

Working in cooperation with the railroads and shippers, the Youngstown Steel Door Company developed this "double door" arrangement—one 8-ft sliding "plug" door and one 8-ft conventional sliding door. Doors work independently to give a 16-ft opening on each side.

The conventional corrugated door is supported for movement by a plate track, which also supports the sliding plug door.

The plug door, based on a design primarily for refrigerator and insulated box cars, consists of a metal panel reinforced with structural members.

The desired thickness of the door is obtained by wooden members so that it is flush with both inside and outside of the car when seated in the door opening. The plug door is equipped with the Camel screw type door mechanism, which serves to

shift the door laterally into and out of the door opening, and to support the door for movement along the track. When closed, the flush door fastens securely to the car wall, providing an efficient seal.

The front edge of the flush door is overlapped by the sliding door so that the latter serves to brace the flush door against the outward pressure of loading within the car.

The locking mechanism at the flush door has an operating lever so arranged that a grain door cannot be nailed to the sliding door, and the sliding door cannot be closed unless the front edge of the flush door is properly locked. In a closed position, the sliding door prevents movement of the lever of the locking mechanism of the flush door, thus preventing its opening.

Wide Doorway

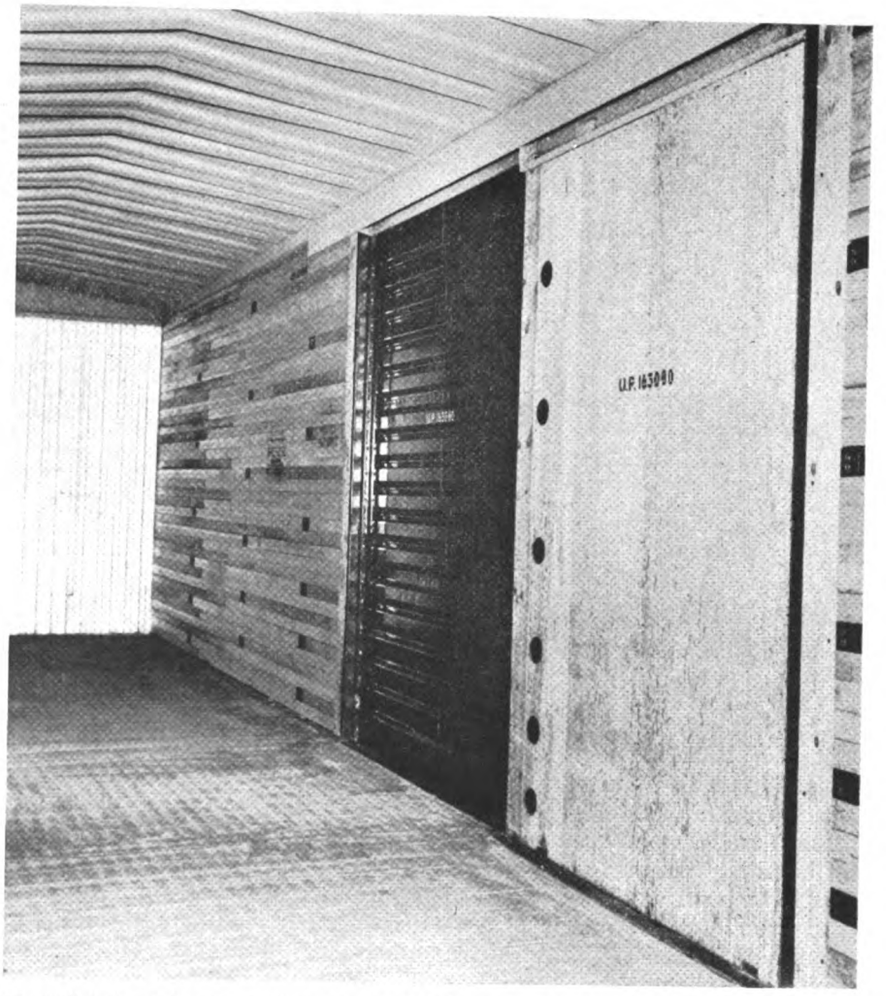
With both doors open, the 16-ft opening provides ample space for maneuverability of mechanized equipment in loading and unloading packaged and bundled materials or palletized commodities.

When used for grain loading, with the flush door becoming an integral part of the car wall, protection is necessary only on the inside of the 8-ft sliding door, making the cost of dunnage the same as on a single door box car.

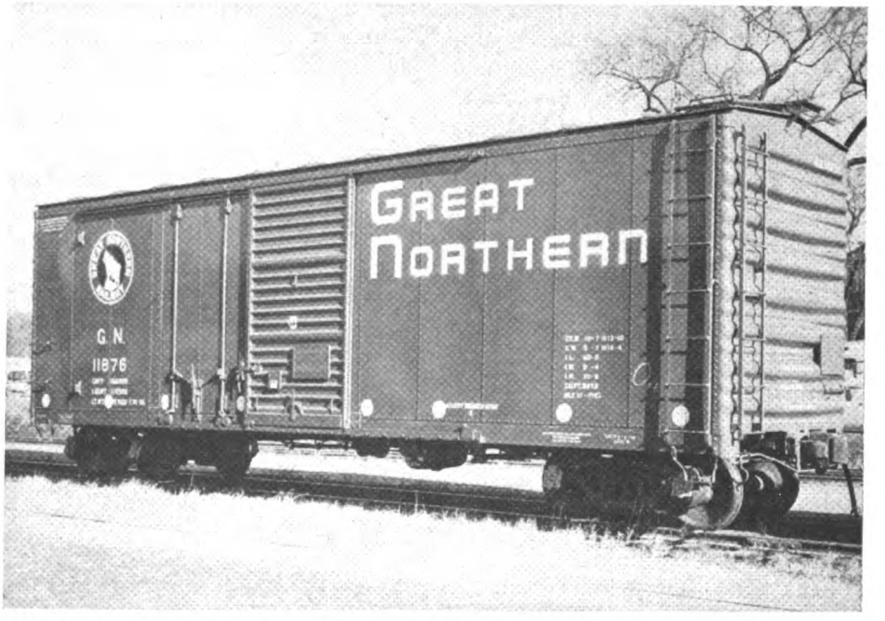
The AAR's Committee on Car Construction gave the wide door design a favorable nod recently when it suggested that railroads contemplating ordering new box cars should examine the 16-ft staggered door arrangement to see if it will meet their needs. Furthermore, it is suggested that by concentrating on a door arrangement of this size, cars of this type can be built at less cost. The committee said it also considers it desirable to maintain the principle of one plug type door and one sliding door on each side.

Three railroads have some 3,500 cars of this type on order, the SP with 2,900 from company shops, and the UP with 500 under construction at Omaha. Twenty-five UP cars are in service.

The GN has five experimental cars in test service. These cars are 40 ft long, with a 6-ft plug door and a 6-ft conventional sliding door on each side, providing a maximum opening of 12 ft.

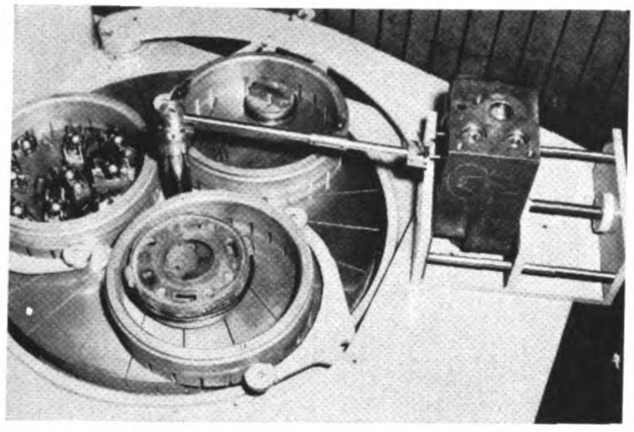


Plywood lining and strap anchors are applied to inside of plug doors on UP's 50-ft box cars. The doorways are staggered.

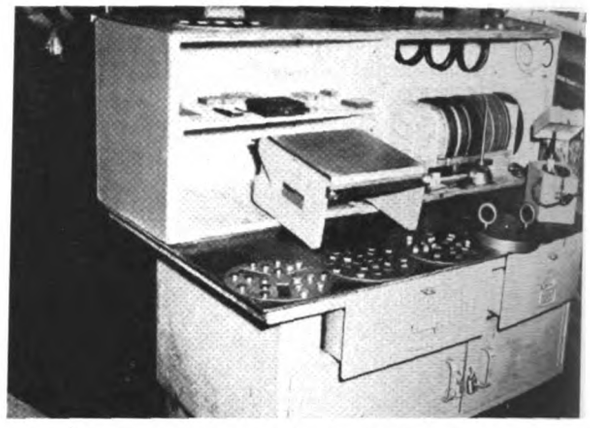


Great Northern made plug-door application on 40-ft box car. Doorways are staggered across the car on this type also.

While the western railroads have been first to adopt this design of car, AAR people feel that it is in no sense a "regional car," but one that is adaptable to all parts of the country.



Rubber O-rings are put around some parts to protect them as they roll within the rings. Purpose of the rolling motion induced by the rings is to improve the lap, to prevent wearing a path in the table, and to condition it.



Storage bench holds over a dozen container pieces for different types and groups of small parts, polishing board, and optical flats for measuring trueness of finished surface. The weight between the parts and flats covers a plateful of small parts.

Lapping Operations Speed Up Output

Lapping air brake, air compressor and some small diesel parts by machine instead of by hand has led to savings in two ways—(1) a quantity of parts are lapped simultaneously in less time than one piece can be lapped by hand, and (2) badly worn parts can often be reclaimed economically, whereas by hand the cost would have been so great that it was often cheaper to scrap the part.

The machine used is a 24-in. Lapmaster. Principal items handled are slide and rotary valves from both car and locomotive brake equipments, and the inlet, outlet and intermediate valves (all spring loaded type) on all models of driven compressors. Theory of the machine is that it puts a virtually perfect flat surface on a part—thus if two mating surfaces are finished on the machine they will be automatically lapped together when assembled the same as if one surface had been hand-lapped direct to the other.

It normally takes 12-15 min. to recondition a group of valves (typical combinations are shown in the machine photos — some of many other possible groups are the three on the bench). While this work is being handled on the table, the shaft drives a rod through an eccentric mounting to move a hone back and forth over the slide valve seat in the brake valve.

The first step in reconditioning a valve that does not pass the test rack after cleaning is to hand stone the slide valve and its seat. In somewhat over half the cases, the valve will then pass the test. When it does not, the valve is stripped and the slide and rotary valves lapped on the machine. No attempt is made to keep parts of any brake valve together. Parts are mixed indiscriminately and lapped in groups like those illustrated.

When the machine has completed the lapping, the valves are flat but have a dull finish. For checking their flatness, they are rubbed lightly on a polishing plate containing jeweler's rouge, then checked by optical flats.

Slide valve seats are lapped indirectly with hones through an eccentrically mounted shaft. Two steel hones and one bronze hone are used—each for four minutes. The one 12-min. cycle completes the emergency slide valves. The service portion slide valves require two 12-min. cycles because no weights are added during the lapping. The hones are conditioned on the table before each usage. This is usually alone while an alternate hone is conditioning the seat.

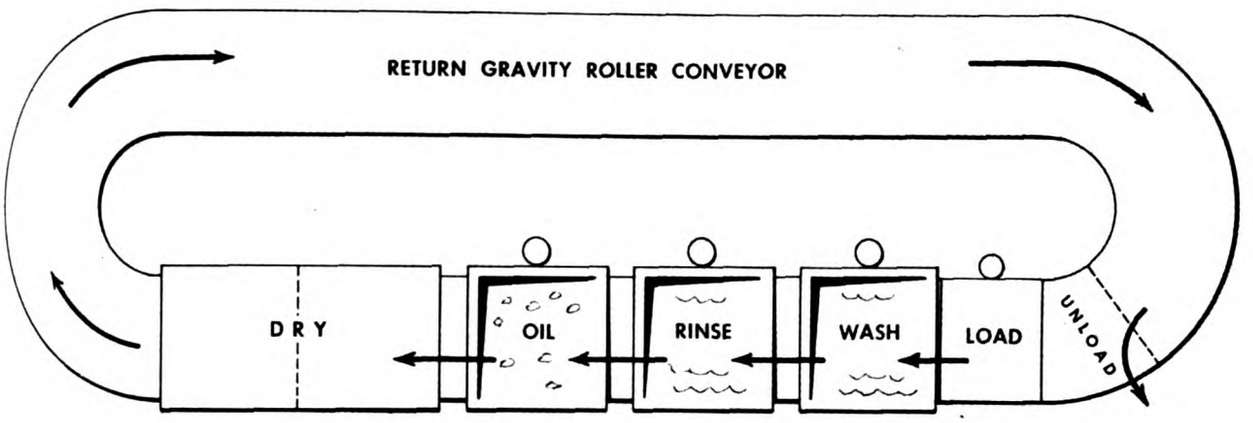
Large as well as small air brake parts are handled on the machine. Rotary valves, which formerly took 1-2 hr by hand, are done 1½ at a time plus some small parts.

The same grinding compound in the same proportion (4 oz per gal oil) is used for honing the seats as well as for conditioning the hones and other lapping operations on the table. The grinding compound mixture is fed to the table down a wire. Paddles keep the solution mixed in the reservoir until use. Two different rates of flow are attained by two sizes of orifices. The used oil is caught in a bucket and discarded.

A larger (72-in) Lapmaster is contemplated for the diesel shop to lap the joints on Alco and EMD where the heads fit to the liners and to the engine block.

One ring has four circular sections milled out to accommodate a D-24 control valve. The balls from an old bearing in the second ring add weight to reduce the lapping time on emergency slide valves.

While three groups of small parts are being lapped, a hone on the end of the eccentrically connected rod laps the slide-valve seat. A second arm will permit two such seats to be lapped at the same time.



A general arrangement of the equipment is shown in addition to the movement of the filters being processed.

Filters Cleaned . . . While You Wait

The Elizabethport (N.J.) diesel locomotive shop of the Central Railroad of New Jersey reports economies from a recently installed automatic filter cleaning machine. The equipment, designed and built by Magnus Chemical Company, is known as the Magnus Automatic Filter Dip. It washes, rinses, oils and dries, or "cures," diesel locomotive air filters.

The technique involves handling the filters in baskets. Full immersion is employed in each step, in addition to an up and down mechanical agitation of the pieces in the various solutions to speed up the cleaning action. The Jersey Central installation completes a cycle of one batch of filters in 75 minutes.

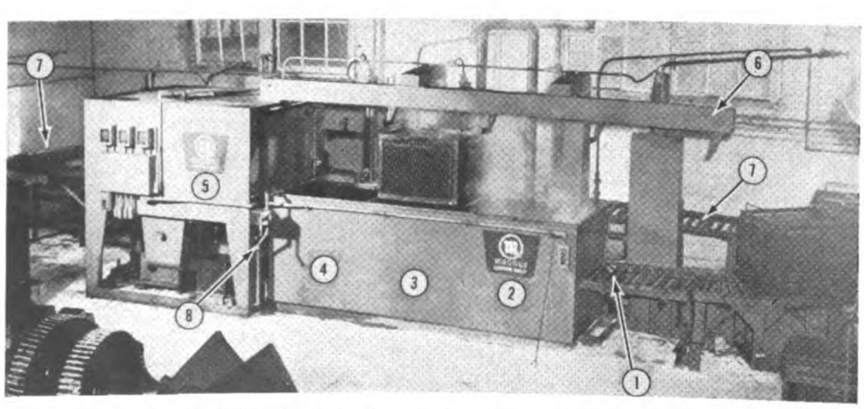
Sequence of Operations

After loading of the dirty filters in the basket, it is automatically moved to the cleaning solution tank. This tank contains a solution of Magnus Super SR cleaner heated to about 190 deg F. The filters are agitated up and down 80 to 100 times a minute for up to 30 minutes. This stage combines chemical and mechanical forces to cut out the accumulated dirt.

The conveyor transfers the cleaned filters from the cleaning tank to the rinse tank. Here again, vigorous up and down movement is combined with a scalding hot water rinse. After this rinsing they are automatically conveyed to, and completely submerged in the oil bath to insure a thorough coating of the filters. Emerging from the oil bath, the filters are permitted to drain and are then transferred automatically to a two-stage, steam heated dryer. Any dripping that persists is carried to a pan in the first stage of this final operation. A roller-gravity run returns the finished batch to the point of origin. This self-return feature was included to permit one-man operation of the entire machine.

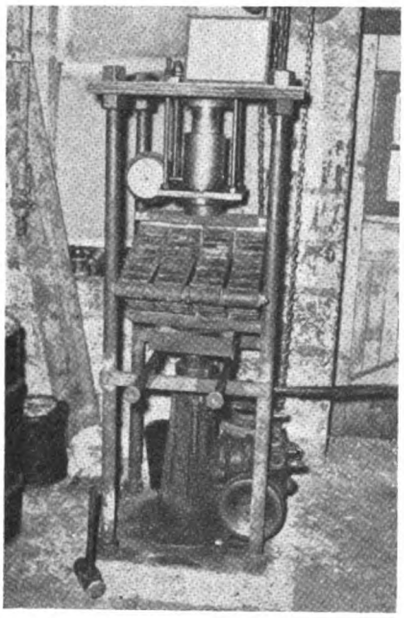
There are 22 to 30 filters on every diesel locomotive on the Jersey Central roster to be cleaned every month. This machine is designed to process up to 96 filters an hour. Under the old method of immersion in a still tank, only 30 to 40 could be done in the same period. Being a manual operation, the charge to labor was necessarily high. More important was the fact that the former method was not cleaning the filter adequately. An indication of this fact was that during the first few weeks that the Magnus machine was put into use, nearly a foot of sludge accumulated in the bottom of the cleaning tank each day. As filters cleaned by the old method were finally eliminated, the sludge level dropped.

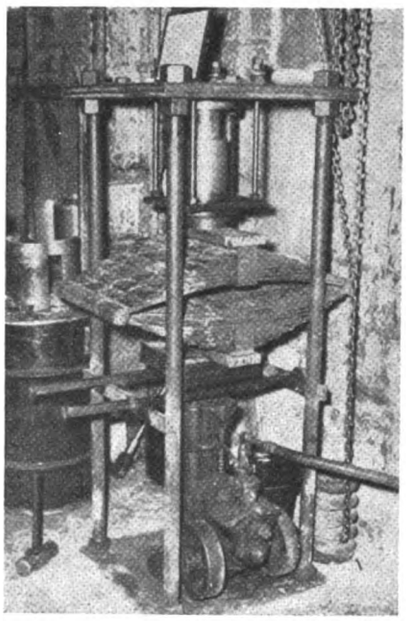
It was decided, from actually using this machine over a period of several months, that the cleaning solvent solution should be changed after each day's use. The oil bath level is merely maintained by a hand pump as required.

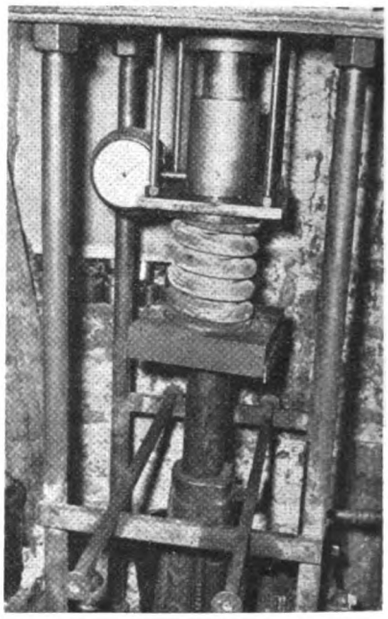


Briefly described, (1) is the level loading platform from which a basket is picked up and deposited into the wash or cleaning tank (2). Basket is shown suspended over the rinse tank (3). From here it is transferred to the oil bath (4) and ultimately to the dryer (5). Movement is effected by the portion marked (6) or transfer mechanism. The roller gravity conveyor run (7) returns the baskets to point of origin (1). Hand-cranked oil pump (8) is adequate to maintain a proper oil level in tank (4).

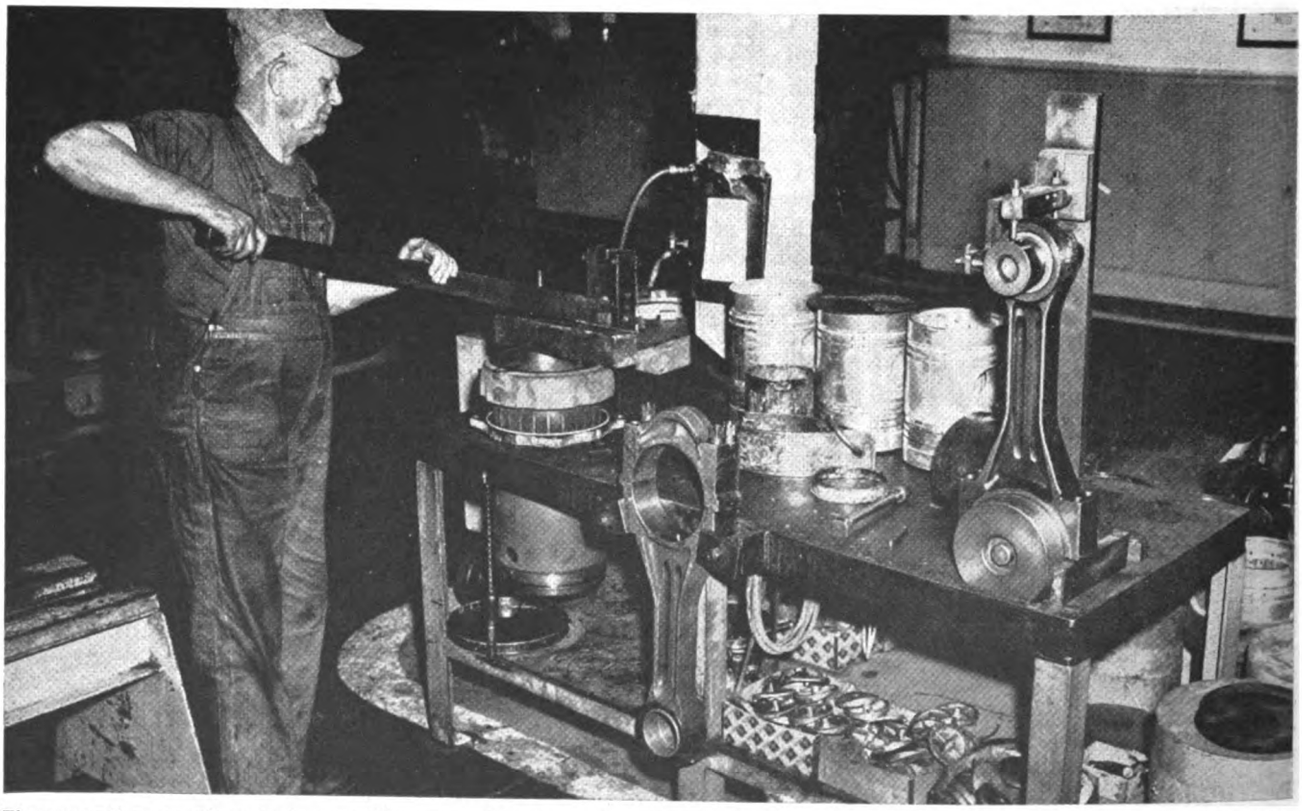
Ideas for the Diesel Repair Man...



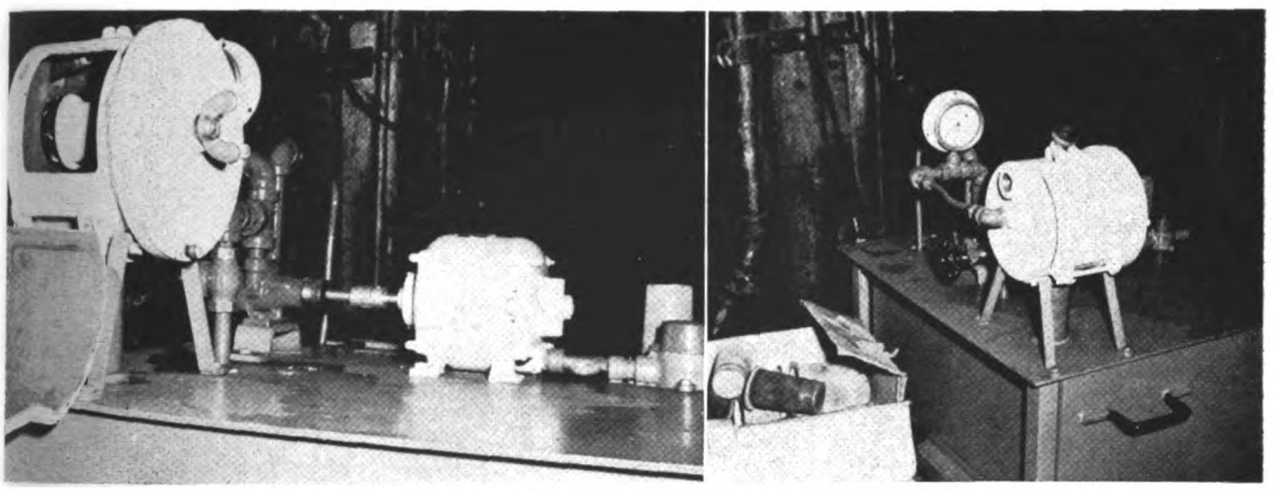




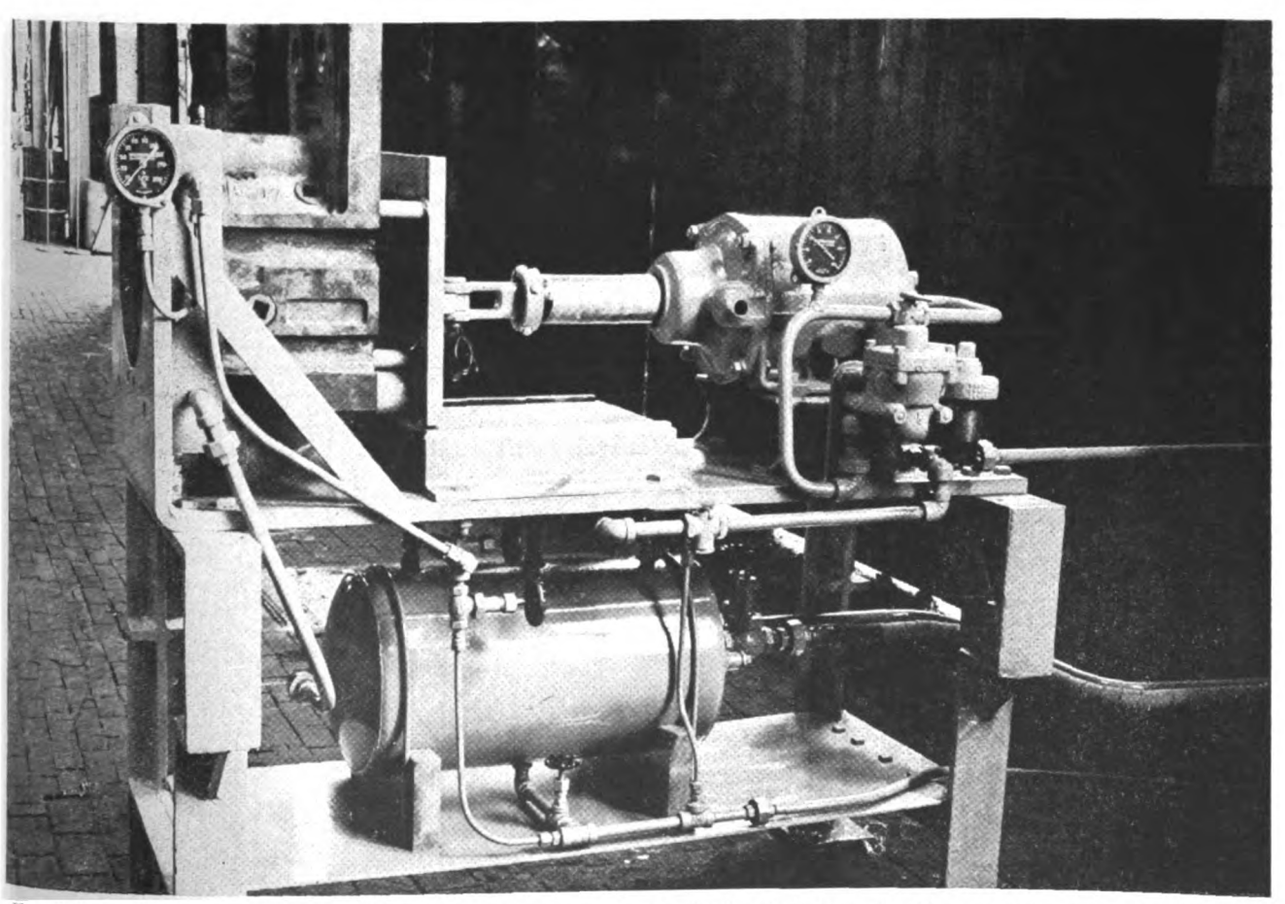
The GM&O tests diesel locomotive (and passenger car?) springs each time the trucks are rebuilt. Both elliptic and coil springs are checked in the above unit in which an air jack compresses the spring up against a hydraulic cylinder. The gage connected to the cylinder is calibrated to indicate directly the pounds of force on the spring. Conditions checked for each spring are the deflection at maximum load and the load required to make the spring go solid.



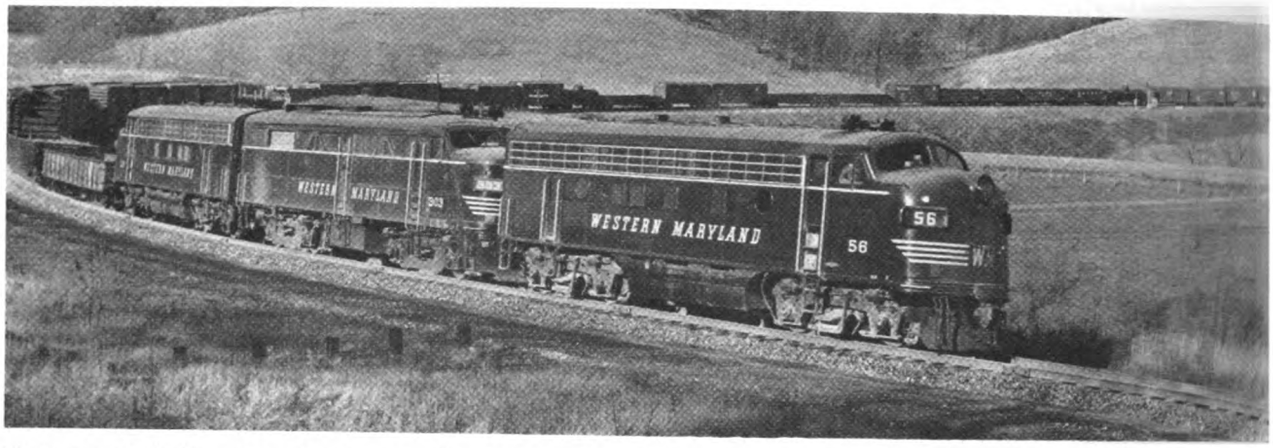
Three operations on Alco cylinder assemblies are performed on this small bench (left) liners are pressed in; (center) bearings are miked; and (right) rods are checked with feelers for being high, low or twisted.



Sintered bronze fuel filters are cleaned in 2 min. by this arrangement. The filter is attached (left) to a common shaft with an air turbine which spins it at 10,000 rpm with the loading door closed (right). Filtered fuel at 40 psi is supplied to the chamber by the separate motor-driven pump. The combination of the pressure and the centrifugal force forces the fuel through the pores from the inside out (with steam the water clogs the pores). The fuel enters through the piping in the center. Air to spin the turbine (at 90 psi) is supplied by an air hose through the threaded hole near the top.



Alco cylinder-head test stand provides a quick method of checking for water leaks. Water in the tank on lower shelf of the stand is heated with steam to about 190 deg F, and is circulated through the head until it is nearly this same temperature. The air cylinder holds the head against blanking plugs fitted with standard grommets. Air pressure applied to the hot-water tank is 90 psi.



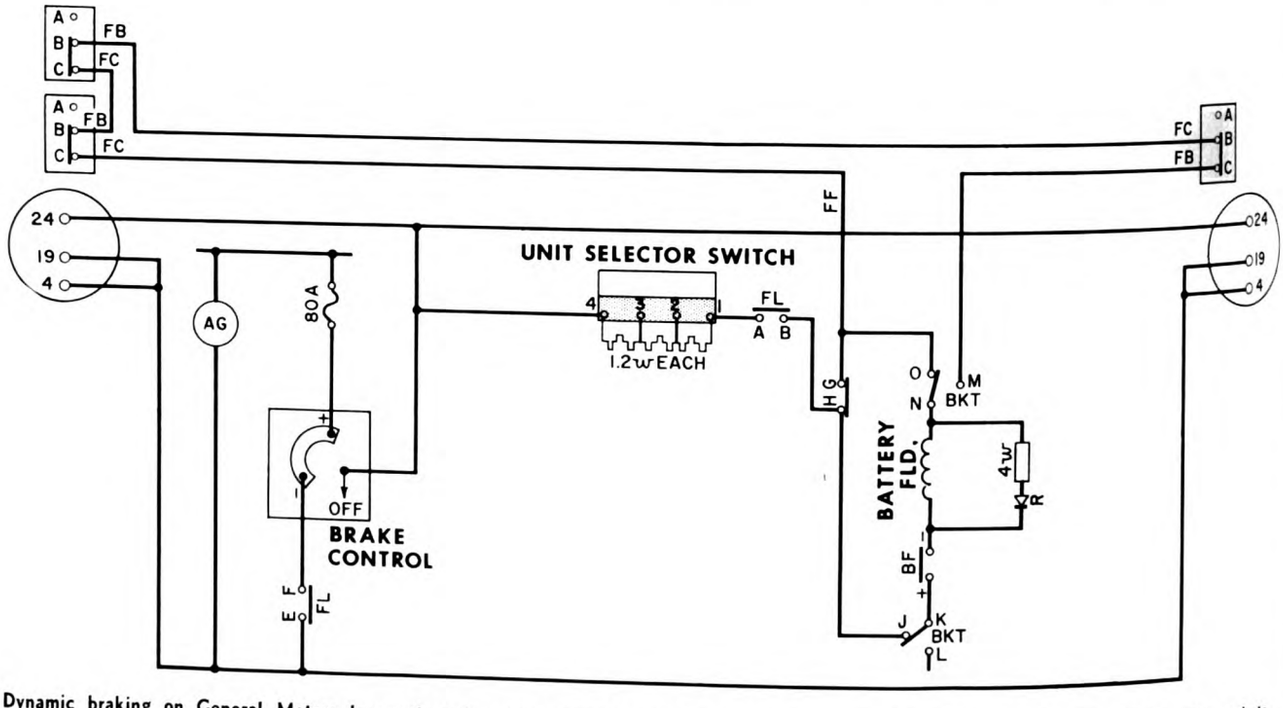
All in dynamic braking, three A units—one Alco and two General Motors—descend into Cumberland, Md.

Western Maryland Ups Locomotive Utilization . . .

Alco and EMD Units Run M-U

LOCOMOTIVES which are frequently not very symmetrical, but always very practical, are made possible by a Western Maryland program which now enables any combination of its Alco and EMD road freight and road switcher units to operate together. A big step was taken when all the A units received full sets of air and electrical trainline connections at the nose end. This operation cost less than $2,000 per unit and, according to the WM, the money was well spent.

The Western Maryland has found



Dynamic braking on General Motors locomotives is current sensitive, but this arrangement makes Western Maryland EMD units activate Alco braking.

some problems which have to be considered in a program of this type. A large number of the Alco contactors are solenoid-operated as contrasted with the air-operated magnet valves of the EMD units. This requires heavy currents through trainlined circuits and can result in overloading of the EMD wiring when several Alco units are in the locomotive consist. This problem has been solved by paralleling unused wires in the EMD 27-conductor trainline with each of the following: negative (*4*), generator field (*6*), and pneumatic control or PC (*13*). At the same time, the alarm and signal circuits of the Alco units are designed for lighter currents than are developed on EMD units and can be the source of occasional relay contact difficulties on Alcos.

The difference in the loading characteristics of the two locomotive control systems produces an m-u operation which must be watched during train starting, according to the WM. Controlling or slowing trains is a problem which the Western Maryland has solved with additions to the basic dynamic braking circuits of each builder. Briefly, the basic Alco system is actuated through the amplidyne excitation circuits on each unit with variable voltage from the lead unit. The basic Electro-Motive dynamic brake relies on varying the current from the lead unit through the field loop for battery field excitation of all the units in the consist. This means that the basic Alco system is designed to handle only a few milliamperes and that the basic EMD system must handle currents up to 14 amps. These high EMD excitation currents have required the use of a field loop circuit with heavy-duty trainline connectors. Alco dynamic braking currents can be handled through the standard multiple-contact m-u plugs.

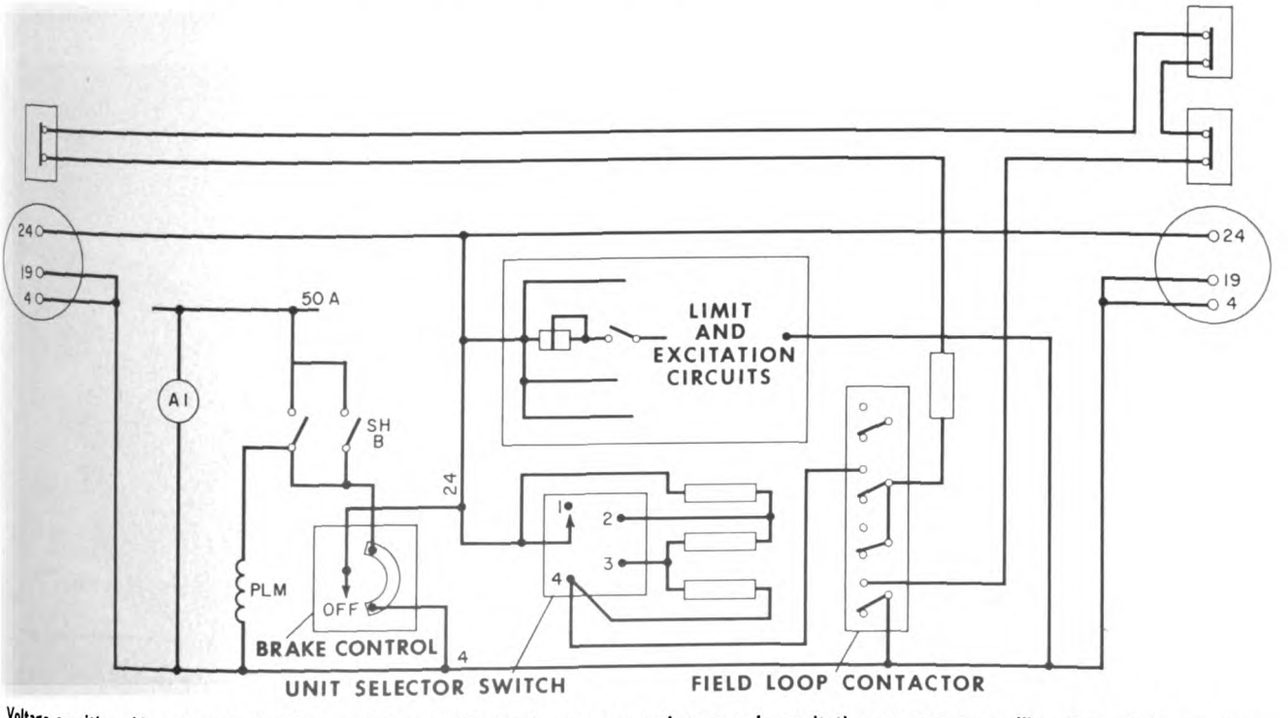
Here then was the WM problem. To be completely compatible and to allow complete freedom of operation, the system would have to be arranged so that either an EMD or Alco unit could be in the lead, and so that it could actuate and control any and all trailing units. The solution on the WM has been the installation of field loop circuits on all Alco locomotives and the assignment of the *24* wire in the 27-conductor trainline of all units to dynamic brake operation.

Alco cab units also were equipped with the EMD unit selector switch and with an EMD field loop contactor assembly. In the field loop of each Alco unit is a resistor which duplicates the resistance of the EMD battery field circuit. The basic dynamic brake controller rheostat on the Alco cab unit has been replaced with a heavier type capable of handling the higher field loop currents.

What does all this produce? Assume that an Alco unit is leading. The dynamic brake is activated by moving the selector handle to the *Braking* position. This causes current to flow through the *17* wire and puts power circuits on EMD and Alco units into the dynamic braking position. Moing the transition lever into the *Braking* range feeds variable voltage through the *24* wire to the excitation and limit controls of all trailing Alco units. The leading Alco unit and all trailing Alcos are then excited through their amplidyne control systems. At the same time current flows through the field loop circuits and provides the excitation for all the trailing EMD units. Each Alco is equipped with a resistor in its field loop equivalent to the resistance of the EMD battery field circuit, and this makes it possible to use the selector switch on any leading unit and set it for the actual number of units without any corrections for type of locomotive.

If an EMD unit is in the lead, it feeds the field loop to operate its own, and all trailing EMD dynamic braking systems. At the same time it feeds the *24* wire to operate trailing Alco units in dynamic braking.

(*Continued on page 74*)



Voltage-sensitive Alco dynamic braking on Western Maryland was arranged to supply excitation current to trailing General Motors locomotives.

2 Roll Them Out Like New

Importance of Proper Handling In Shipping Equipment

Don't kill the patient on the way to the hospital!

THE FIRST STEP in a repair program is to get the job to the shop. This sounds simple enough. But woe betide the equipment that has to be removed from its safe, snug position in the locomotive. Handling and moving exposed equipment can be the most hazardous time of its life—especially if the equipment has already failed. It is like first aid to an accident victim. Well-meaning but careless handling can cause more harm than the injury itself. Remember—"Don't kill the patient on the way to the hospital"!

Handle With Care

As an example, take some sturdy item like a traction motor. Mounted in the truck under the locomotive it is subject to severe punishment. Yet for thousands of miles it does its work through heat and cold, wet and dry. Then comes the day when it is removed for overhaul. What happens to the axle caps? Are they knocked back and forth with a sledge until they crash to the floor and are then forgotten? Be sure they are sent to the shop with the motor to which they belong. The axle caps are machined with the motor frame and wear with it, so they should be checked and repaired together.

What is done with the suspension bearings, wicks and springs? Although these parts are husky they can be bent, twisted or dented by careless handling. Then they must be replaced or repaired. A misplaced blow from a sledge can dent and crack the oil chamber of the axle cap. It must then be welded to pass shop inspection. In the process it may be distorted. That means more work to correct it. All this needless time and effort is the price exacted by one faulty blow!

A motor removed from its axle no longer has the protection of the driving wheels. The end of the shaft is now exposed. A sharp endwise bump on the pinion can break out the thrust flange of the commutator end bearing, as shown in Fig. 1. This can occur either during installation or removal of a motor. The damage is hidden, so the motor may be sent out—only to have a bearing failure on its first trip. The chances for such a bump are ever present. It may happen when the motor swings in crane hooks, or when it shifts during shipment; even when it sits in storage another motor or wheel and axle can be swung against it. For this reason a pinion guard, see Fig. 2, should be applied as soon as possible.

Cables are probably more easily damaged than any other motor part. Again and again a motor is set down on its own cables, Fig. 3, smashing the terminals and cable insulation. Before a motor is moved, the cables should be carefully coiled up and secured out of harm's way, as shown in Fig. 2. Renewal of damaged cables is a big job. The armature must be removed and the cables disconnected from bolted or brazed field coil terminals. New cables must be installed and everything put back together again. It's a pretty expensive task—all caused by a moment of carelessness or haste.

When separated from its air duct connection, a motor is wide open for trouble. An amazing assortment of nuts, bolts and cotter pins can drop into the ventilating opening on top of the frame—and on awfully short notice too! Now suppose the armature is turned, perhaps to remove a pinion. A loose object can quickly wedge itself between a brush holder and the commutator. There it plows a deep groove in the commutator surface, as shown in Fig. 4. To correct such damage the commutator may have to be turned, throwing away years of useful life. A sheet iron cover, Fig. 2, should be snapped or bolted over the air opening as soon as

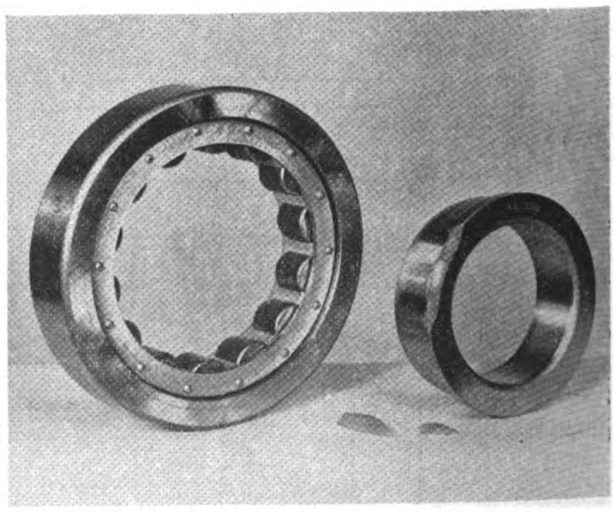


Fig. 1—Commutator and bearing with damaged thrust flange.

This is the second article in a new series covering heavy maintenance of locomotive electrical equipment.

By J. W. Teker, Locomotive and car Equipment Department, General Electric Company, Erie, Pa.

it is exposed. This simple precaution should be taken regardless of the reason for the motor change-out. To be effective the cover must be applied at once and left on until the motor has been installed in the locomotive again. Don't remove it until you know there are no loose objects in the locomotive air duct. This kind of caution pays off handsomely.

Another thing, when in service a motor is heated during operation. This helps keep the interior dry. Also, a powerful blast of air sweeps over the insulation surfaces and out of the frame vents. This helps keep grit and water from entering. The gear grease protects the pinion and shaft against rust. When the pinion is removed from a change-out motor and placed on the shaft of the ingoing motor, the shaft of the change-out is exposed. Even though a mechanical guard is placed over the shaft to ward off nicks and bumps, it is no protection against rust. The precision-machined, tapered surface of the pinion fit can be quickly ruined by rust unless it is slushed or otherwise protected. The same applies to all exposed machine fits, such as shaft extensions; bores of gears, pinions and pulleys; couplings and register or rabbett fits.

Many good rust preventive products are commercially available. Each has its good features. Some are long-lasting, others are easy to remove. There are treated wrapping papers that give off rust-preventive vapors. Even slight moisture on the part absorbs these vapors thus stopping rust. The vapor reaches out to protect irregularities, such as threaded parts, not in actual contact with the paper. Moisture-absorbing crystals are also available for this purpose. Where the vapor method can be used, you don't have to clean off slush to use the part. In making your choice, check with your laboratory and shipping people to find what is best suited to local conditions and experience.

Mechanical parts, as well as electric machinery, are liable to damage in handling. Take the frequently handled item of wheels and axles as an example. These are often nested or staggered as shown in Fig. 5a. In this way they occupy the least space, so more can be placed in a car for shipment or stored in a given space. This is good; but beware of the wheel flanges striking the next axle. If they do, they can put a bad dent in the motor suspension journal surface of the axle, Fig. 5b. This dent is hard to remove without remachining the axle to a smaller diameter. Close examination of such a dent, Fig. 5c, shows that the bottom is below the journal surface. The edges, however, where the metal was pushed out from the depression, are raised above the surface.

So, in addition to a depression that will not carry load, you have a raised bump that will score the bearing and wipe out bearing surface. Really, the bump does more harm than the dent. If an axle is dented just before a motor is assembled on it, the harm may go unnoticed. Then the suspension bearing is in for a rough trip. Is it any wonder that this newly overhauled motor should have trouble on its first trip?

One way to protect an axle from denting is to wrap a layer of wood slats, Fig. 6, around it as soon as possible. These can be secured to a belt arranged to buckle or tie on. Another way is to set the wheels in notched retainers which space them so they cannot touch the next axle. A combination of the two is best. Then the axle is protected in both handling and storage. Remember, this important bearing surface must also be protected against rust. The wooden slats may ward off bumps, but they also collect moisture. This makes a fine setup for rusting. A good procedure is to wrap rust-preventive paper on the axle before applying the slats. After all, this is an exposed piece of machinery no longer protected by the bearings. It is just as easily damaged as the journals of a diesel engine crankshaft. For some reason it is hard to think of an axle this way; probably because it keeps close company with the wheels that do not need protection.

Now the first handling is over, but the machine is not yet out of danger. Next it is going to be taken for a ride in a truck or railroad car. Both make sudden stops

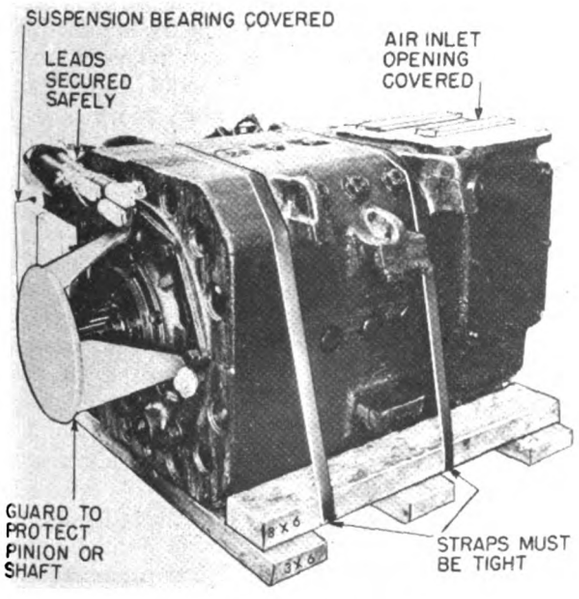


Fig. 2—Traction motor protected for shipment.

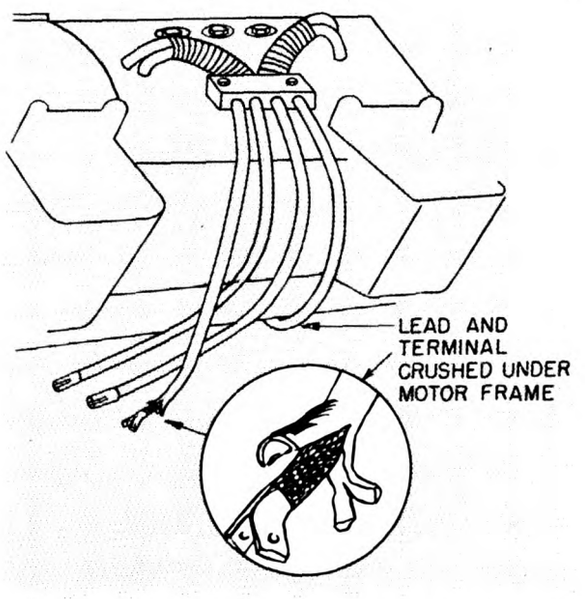


Fig. 3—Traction motor leads left hanging loose are subject to damage.

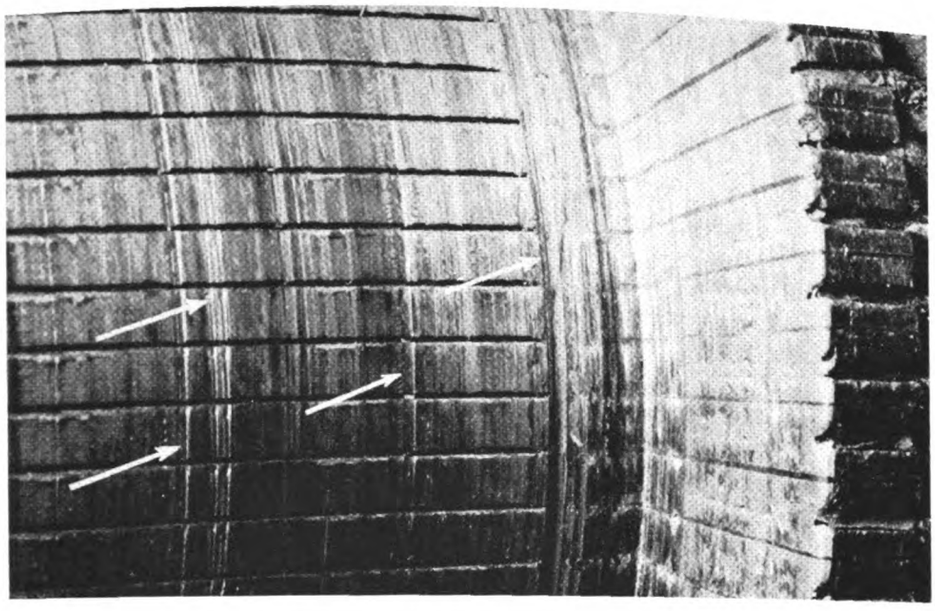


Fig. 4—Commutator gouged by foreign objects wedged under brush holder.

and starts. Both are jolted, as in humping or coupling. Such shocks can be damaging. For instance, let's think of what might happen to a traction generator. Such machines are generally rather high for their base, something like a floor lamp. When coupled to its engine, a generator will survive a collision. By itself, however, it is not much better than the lamp—the first hard jolt will topple it over. Such a fall is disastrous. A machine that was on its way for a needed cleaning must now be rebuilt. Here it's certainly true, the bigger they are the harder they fall.

Safeguard the Shipment

An experienced shipper takes into account the shape, and compares the height and base of a machine. As a "rule of thumb," the base should be longer than the height. When the base is narrow, as with some traction generators, a suitable skid, Fig. 7a, must be used. Experience has shown that generators 5 to 6 feet in diameter should be mounted on skids 8 feet long for rail shipment. For truck shipment 7-foot skids may be used. In case of doubt, refer to the builder's instructions for shipping information.

Skid timbers must be of adequate size and, preferably, bolted together. Remember that green or wet timber will shrink upon drying. This may leave the fastenings loose. Don't underestimate the terrific force of an impact on a heavy machine. Be sure to use positive fastenings, like bolts and nuts. Use large diameter washers to spread the load so the nuts or boltheads will not pull through the timbers. Secure the machine to the skids with bolts through its base or feet. If this is not possible, use care in securing fastenings to other parts of the machine. Bend $\frac{5}{8}$-inch rod into "U" bolts with threaded ends, Fig. 7a, and shape them to go around at selected points. To avoid damage stay away from insulation, terminals or delicate parts.

Load the shipment with the long way of the base in the direction of travel since this is usually the direction of the impact. Even traction motors have been known to roll over under impact. You see, most motors are octagonal (8-sided) so there isn't much base on the bottom of the frame. Therefore suitable skids, Fig. 2, to increase the base length are in order.

Skids are also handy if rollers are used to move the shipment. When building skids, keep fork lift trucks in mind and leave enough space for the fork arms to get under the load.

Finally, don't fail to block or otherwise secure the shipment to the car floor. The long skid base may prevent a machine from falling over, but the whole shipment can still slide. A shifting cargo can create havoc when it crashes; distorting skids and knocking out fastenings. If the shipment is free to move, it may turn crosswise. The benefit of the long base is then lost and the machine may topple over. These precautions may appear to be fussy details, but studies of cases of damage in shipment show neglect of these small but important points.

There is a growing trend to provide special cars with a sturdy "egg crate" arrangement for shipping items like motors and generators. These cars are weather-proof to protect the apparatus during transit. This is in sharp contrast to just loading it into a gondola car. Although that is the easiest way, it may often prove to be the costliest.

Hidden Dangers

Even with the machine on skids having a good base, and with it blocked to prevent shifting, we are not yet through. Something not so obvious, even to the experienced shipper, is what can happen to heavy parts inside a machine when they shift during shipment. Take as an example the heavy generator armature enclosed by its frame. A roller bearing centralizes the armature and carries its weight. In some generators this bearing also takes the end thrust of the armature. A self-aligning spherical roller bearing or a ball bearing is commonly used. Generators with fixed armature position are usually mounted on the engine sub-base or on the locomotive platform. The armature is connected to the crankshaft through a flexible coupling to allow for

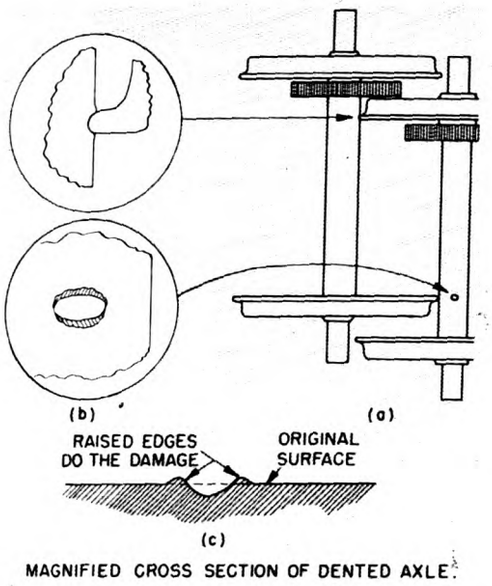


Fig. 5—Careless nesting of wheels and axles can cause damage to suspension journal surfaces.

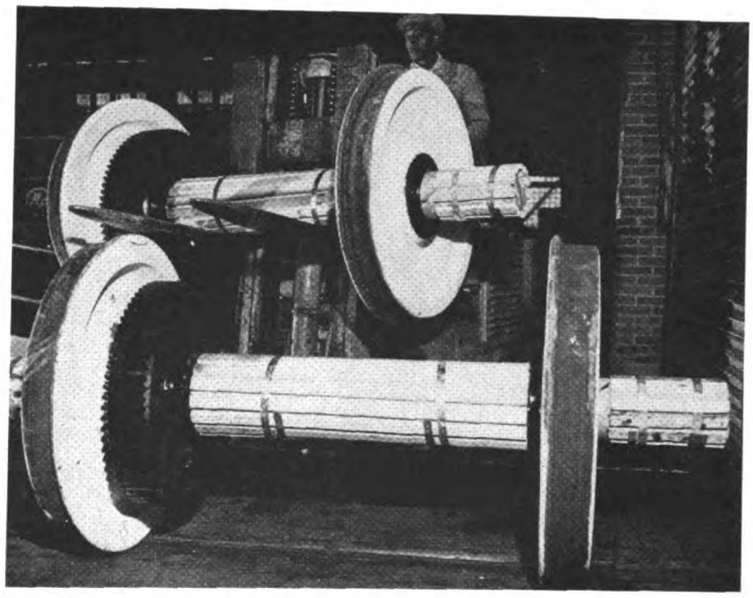


Fig. 6—These axles are protected by a layer of woodslats against damage in handling and storage.

differences in movement between the engine and generator. Other generators are mounted directly on the engine. In this case the armature is connected solidly with the crankshaft. The come and go between the engine and generator is provided by a generator bearing having end play. If a self-aligning spherical roller bearing or a ball bearing is used, it is usually locked to the generator shaft. The outer race is then left free to slide in the bearing housing. This is a metal-to-metal contact with very little sliding motion. Hence it is difficult to lubricate and becomes a source of wear. One solution in more recent designs uses a cylindrical roller bearing. Both the inner and outer races are fixed, the end play movement taking place between the revolving rollers and the inner race. Lubrication is better, and experience has proved this to be an excellent solution to the problem.

When this type of generator is removed from the engine, the armature is no longer restrained by the crankshaft. It is now free to shift endwise under impact. When this happens the inner bearing race drags lengthwise across the now stationary cylindrical rollers. The pressure exerted by the heavy armature on these fine line contacts with the rollers smears grooves across the polished surfaces. The bearing is ruined, as shown in Fig. 8. If the generator is headed for the shop, this damage will be found and the bearing changed out. But if it is going into service, nothing may be found until some alert running maintenance man hears the bearing clicking. If not detected in time, the bearing may fail completely, causing severe and extensive damage.

This hidden damage to roller bearings can be avoided by blocking the armature so it cannot shift within the

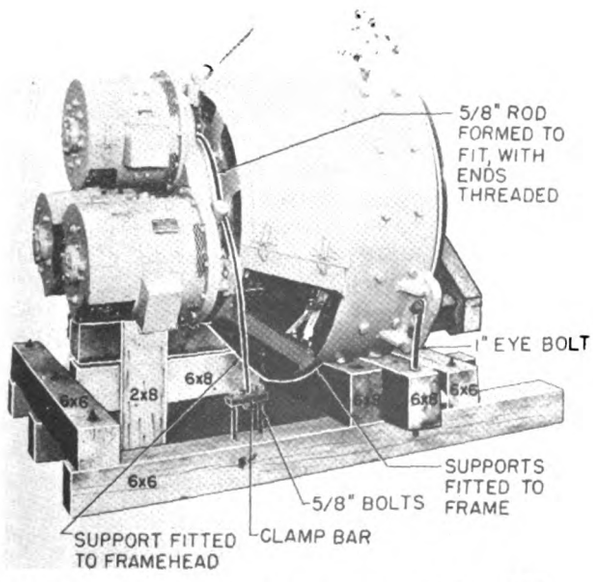


Fig. 7a—Front view of traction generator mounted on skids.

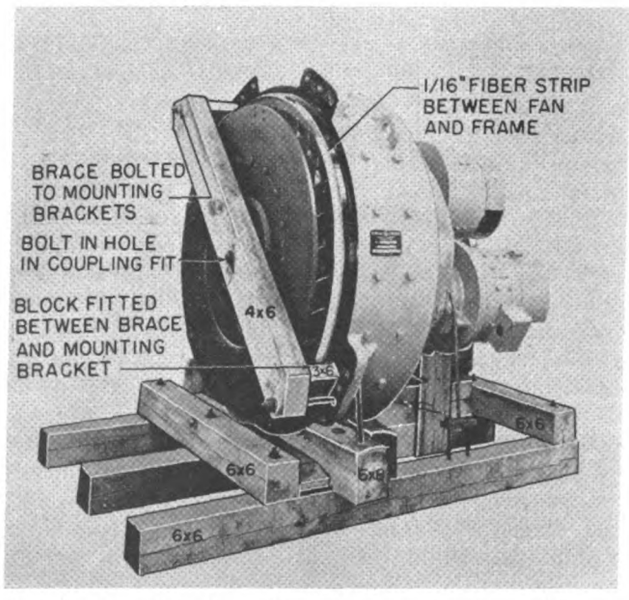


Fig. 7b—Rear view of traction generator mounted on skids.

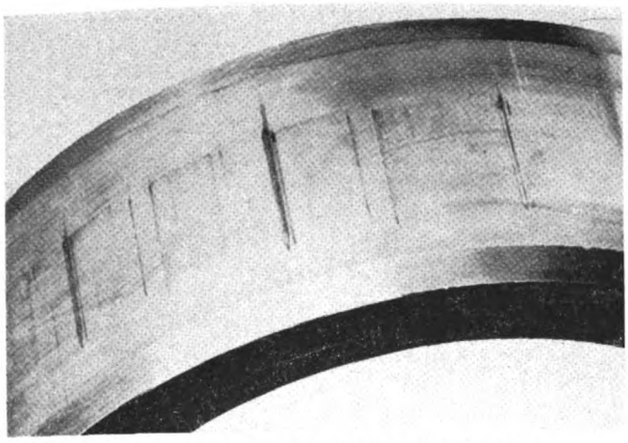


Fig. 8—Careless handling smeared this inner bearing race.

frame. This is best done with a beam bolted across the engine coupling face of the armature, Fig. 7b, and the end of the frame. With proper spacing this will hold the armature midway in its bearing position. Don't just force the armature ahead to the end of its travel. If you do there is danger of bending or damaging the flingers or bearing chamber seals. Study the builder's instructions and section drawings so you know what is happening. Remember that bearings damaged in shipment are easy to identify. The source of the trouble can easily be traced, especially if the machine comes in without the armature properly secured in the frame.

Impact is not the only cause of armatures shifting and marking their bearings. If a generator is tilted far enough when it is lifted, the armature will slide down hill. Sometimes a generator is purposely tilted to turn it from a horizontal to a vertical position for disassembly. If this is done the armature must be secured against sliding in the bearing. Fixtures for this purpose are available or can be made. (Refer to builder's instructions and tool lists.) These are bolted to the end of the shaft and the frame head to prevent sliding and overloading the bearing housing seals.

Equipment out of its working position in a locomotive is like an egg out of its nest. You don't have to move equipment 100 miles to get into trouble,—it can be damaged in moving it only 10 feet. Remember, more accidents happen at home than anywhere else.

Alco and EMD Units Run M-U

(Continued from page 69)

Not all Western Maryland locomotives were built with dynamic braking, and not all units have even yet been so equipped. However, all locomotives which may operate in road freight service are equipped with a field loop and with dynamic brake interlock in the D-24 control valve so that they will operate in a locomotive consist without complications, when the other units are in dynamic braking.

This multiple unit operation of two builders' locomotives has been further complicated by a mixture of models. The roads early EMD F-7 units are limited to a maximum of 600 amp in dynamic braking, and the later F-7 and GP-9 units to 700 amp. The Alco road switchers are not to exceed 650 amp and the Alco road freight units can operate at currents up to 800 amp. The Western Maryland has now equipped all of its locomotives with automatic dynamic brake limiting controls, instead of relying solely on the brake warning signals to prevent overloading of braking grids and power equipment. Result of all these changes has been an increase in locomotive utilization.

From the Diesel Maintainer's Note Book

A Piece of String

By Gordon Taylor

A FOUR-UNIT LOCOMOTIVE, consisting of two Alco A units and two Alco B units, was dispatched from a principal terminal. The locomotive had hardly cleared the train yard when there was a ground relay action on the trailing A unit.

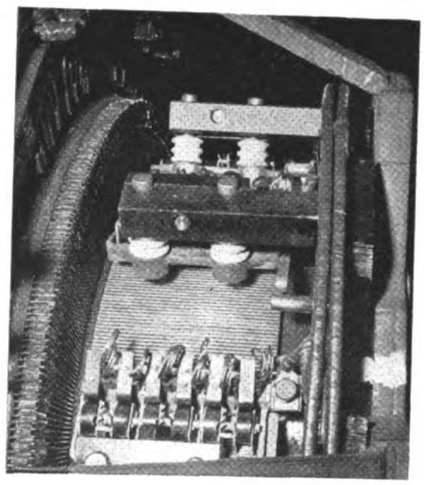
The relay was restored and a few miles farther a second ground relay action occurred, followed by a few miles further on a third ground relay action. At this point, 22 miles out of the terminal, the unit was isolated and the train reduced to a 3-unit rating.

The defective unit was returned dead in the train to its home terminal. An inspection revealed that the power circuit leading from the main generator was grounded by a piece of dirty string, which appeared to be a string from one of the mops used to mop out the floor of the engine room. Apparently, the wet, dirty mop string had landed on a bus bar connection located in the sump beneath floor level near the generator,—one end of the string on the bus bar, the other on the metal frame of the car body. When the generator voltage built up, the current followed the string to ground, with the result that the generator naturally dropped its load.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

How Much Do You Know About Brushes

What Is the Function of Brushes in Commutation?



BASICALLY, COMMUTATION is the word describing the function performed by the brushes and the commutator of a motor or generator. In the case of a generator, this is the function of rectifying or commutating the induced currents in the armature coils. In a motor it is the function of conveying the current to the armature coils. In practical operation, these functions must be performed without damage to the commutator bars, with maximum life for the brushes, and under all operating conditions to which a given machine may be subjected. This may mean high voltage with low amperage, such as obtained at high speeds for a diesel locomotive, or it may mean low voltage with high amperage, such as obtained at starting speeds for a diesel locomotive. A third condition exists in the case of diesel traction motors wherein in dynamic braking each motor becomes a generator and the main generator idles at very low electrical output. A fourth condition exists for the diesel locomotive generator; idling for hours at zero electrical output. Regardless of how thoroughly the practical man has considered these conditions, the ability to operate a diesel unit free from commutator or brush trouble under all of them is what is really meant when it is said that commutation is excellent.

To understand the reason for the difference in the way various brush grades perform it is necessary, at this point, to insert a brief resume of how a traction motor performs. In order to obtain excellent commutation on a diesel traction motor, the brushes must serve as a sliding contact to the bar of the coil being commutated and must also carry the induced current, inherent in the armature coils, momentarily short-circuited by the brush. The short-circuit currents are at a minimum value when the brush holders are so located as to place a stud of brushes exactly at the electrical neutral between the main poles of the machine. The mechanical neutral position of the brushes and the electrical neutral position are not the same. This is because the magnetic flux of the field, called field form, is distorted by the flux originating from the armature coils as the armature rotates. Each main pole of the motor field possesses a magnetic field extending in a symmetrical mushroom-like pattern about the end of the pole. When the motor rotates under power, this pattern or field form is distorted to a varying extent as the armature current varies the armature flux. Simplified, the distortion is the result of the armature field acting at right angles to the main field and pushing off center.

As a help in trying to force the field form back into its symmetrical pattern, poles known as interpoles are located midway between the main field poles. These poles are wound so that, as the curent flowing through the motor increases their magnetic fields oppose the armature reaction, and serve to keep the main field flux where it belongs. However, there is a limit to the benefit which can be derived from the use of interpoles. This limit is reached when the current exceeds a level beyond which no further increase in the strength of the electrical fields of the interpoles can be obtained. This is called magnetic saturation. The influence of the interpoles is also affected when part of the main field is shunted.

By shunting, we simply mean that the magnetic strength of the main poles is reduced. When the main field strength is reduced under a condition of constant load and voltage, the armature current and speed will increase.

All the above considerations read rather easily but bringing them about in practice is not so simple. From the foregoing, it is apparent that it is imposible to build a practical traction motor which will have the brushes in the perfect theoretical neutral position under all operating conditions. Perfect interpole correction of the field form under all conditions is not practical. However, an excellent compromise can and has been worked out by the electrical and brush manufacturers. Using the best compromise neutral setting for all operating conditions puts the job of commutation squarely up to the brush grade.

Whether or not a given brush grade can be expected to perform satisfactorily can be, and is indicated by measuring the commutating range or black band properties of that grade. The black band test measures the degree of electrical maladjustment which a given brush grade can tolerate. In performing the test under laboratory conditions, a motor balanced as perfectly as is possible with respect to electrical neutral, interpoles, and field form is used. Maladjustment is simulated by strengthening (boosting) or weakening (bucking) the interpole current until a certain degree of sparking occurs at the brushes under both types of maladjustment. The current level and voltage to the motor is maintained constant during the determination of the two points. The amperes of boost current required to produce the permissible level of sparking at the brushes represents the black band spread under that test condition. The same is true for

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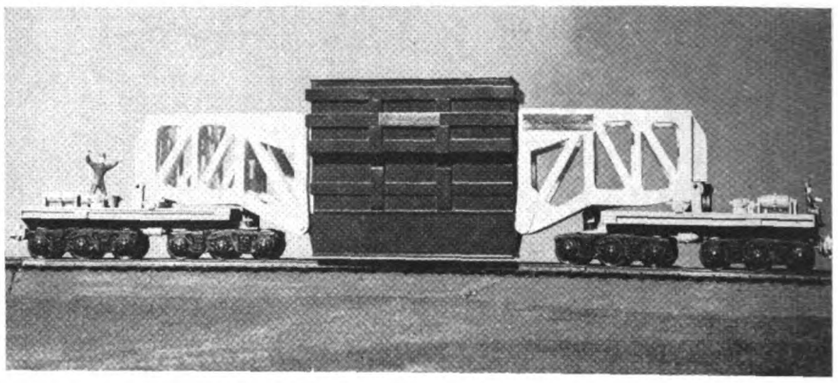
This is the second, of a series of questions and answers which are appearing each month.

the buck current. In practice buck and boost points are determined to cover the range of electrical conditions under which the motor can be operated. These data then represent an excellent picture of the commutating ability of the brush grade being tested. In other words, this test measures how much maladjustment the brush can handle. No test of unproven brushes should be attempted on railroad equipment, without first obtaining this information. A brush grade may have excellent commutating ability under high-amperage, low-voltage, slow freight operation, and fail miserably under the low-amperage, high-voltage and high-rubbing speed of fast passenger operation. Having passed the black band test, the final assay of the brush grade is derived from its ability to film properly on the commutator. It must have a critical rubbing speed which is above the maximum level of rubbing speed which will obtain in service, and it must have adequate life.

The ability of a brush grade to handle all conditions must be built into the brush by the brush manufacturer. This is accomplished by maintaining the proper balance of physical and electrical properties, some of which were described in the March 1957 issue.

By K. R. Matz
National Carbon Company



Three-Part Car Will Carry Huge Transformers

A RAILROAD CAR in three parts, one part being the actual load the car is carrying, has been designed by Westinghouse Electric Corporation. The car, for transporting huge power transformers now required by utilities, is being built by the Greenville Steel Car Company and will be placed in operation early this summer.

The car, with a load capacity of 500,000 lb, will transport a transformer 28 ft long and 12 ft wide. Each of its two identical sections are about 30 ft long and consist basically of an underframe with trucks on which is mounted a steel truss (see illustration). The transformer is suspended between the two trusses, forming the complete car. Primary benefit of the car is that the transformer can be lowered to and carried within about six inches of the rails.

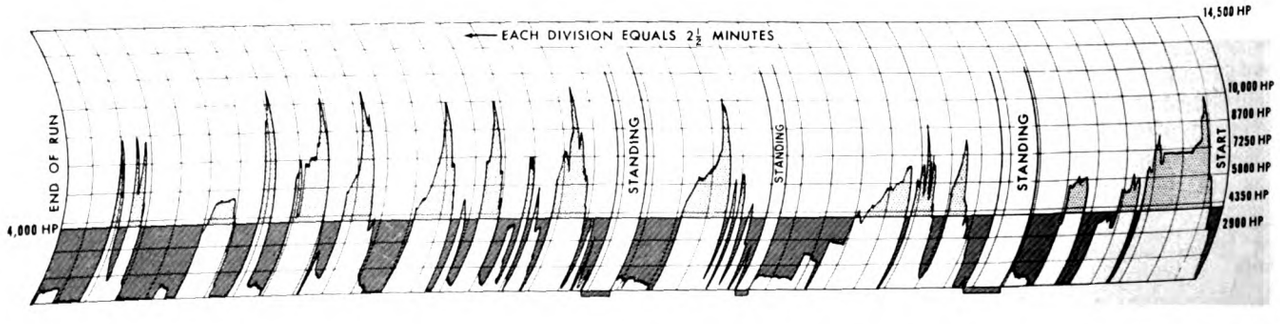
The car, which has an overall length of about 90 ft when carrying a 28-ft transformer between car connections, can negotiate the same curves as a standard box car. Two 100-ton hydraulic jacks at each load center facilitate loading and unloading. Use of the car is limited to certain types of transformers. For the return trip of the unloaded car, the two end halves are hooked together and returned as a conventional car.

What Thermal Capacity Means . . . .

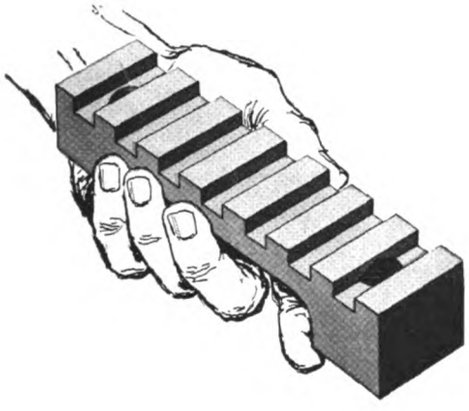
Getting the Most Out of Motors

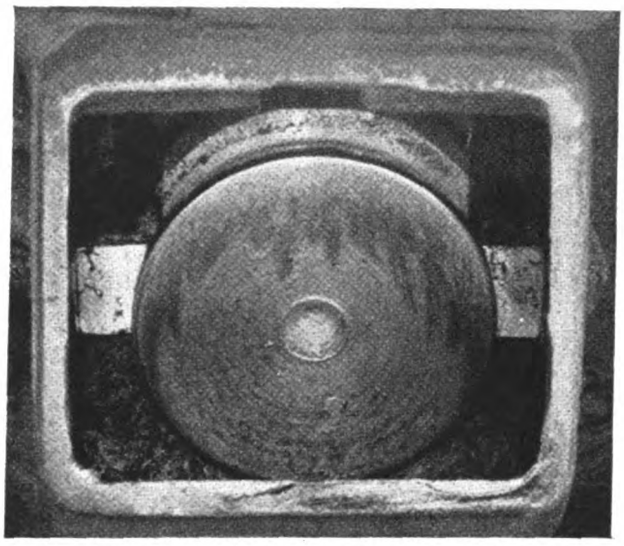
THIS IS THE POWER input curve for a 4,000-hp electric locomotive, hauling an 18-car passenger train on a 100-minute run in regular service. The six motors have a continuous rating of 4,000 hp, but there is a relatively unlimited amount of power available from the overhead wire. So the motors may receive power considerably in excess of 4,000 for short periods, provided their temperature does not exceed prescribed values.

The lightly shaded areas above the 4,000-hp line show the product of current and time which work to raise motor temperatures above safe limits. On the other hand, the heavily shaded areas below the 4000-hp line indicates periods when the motor blowers are removing heat and reducing motor temperatures. So it is possible to obtain high values of power, at times exceeding 10,000 hp, without exceeding safe motor temperatures.



Improve the efficiency of any journal lubricator with Magnus R-S JOURNAL STOPS





Here's proof of Journal Stops' unique ability to hold packing in place even under extreme service conditions. This unretouched photograph shows the interior of a Journal-Stop-equipped box after undergoing an 11½ mph flat-switching impact test. Waste is still firmly seated under the journal.

Longer bearing life and lower maintenance costs for trucks and journal boxes also yield big return on initial R-S Journal Stop investment

WITH conventional waste packing and Magnus R-S Journal Stops, you can run freight cars for *three years* between periodic servicing. That's been established by test experience to date.

Bolted to both sides of the journal box, the bronze bearing-metal Journal Stops form a permanent, built-in waste "container" that holds the mass of packing right where it belongs, even under severe braking and impact forces. And, unlike any other waste container or retainer, by keeping the bearing on the journal, you prevent short strands from being trapped beneath the bearing crown. By restricting fore-and-aft movement of the journal within the box, they prevent squashed-down waste packs, maintain constant journal-to-packing pressures, assure a uniform feed of oil to the bearing and *eliminate danger of waste grabs.*

But that's not all. You also get longer bearing life and freedom from spread linings. You reduce the requirements for an effective box rear seal and increase the efficiency and service life of present dust guards and seals. That's vital to the successful operation of most waste substitutes.

Pad and mechanical lubricators benefit too. By keeping the journal in its proper position, you keep the box from rising during impacts and braking — don't crush the lubricator or seal. Axle dust guard seats can't be scored either.

WHAT ABOUT COST? One private car line estimates it has recovered more than 90% of the total cost of Stops and installation in just the first 20 months of operation. Other roads report comparable savings. R-S Journal Stops not only pay for themselves in reduced maintenance costs. They get cars to destination with trouble-free journal boxes. Write for complete information. Magnus Metal Corporation, 111 Broadway, New York 6 or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

Interchange Rules

This is the twentieth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

208-Q—Where car equipped with auto loading devices is loaded with a contaminating commodity as outlined in Section (12) (b) of Rule 32, is car owner entitled to protection for the resultant contaminating damage?

A—In cases where cars are equipped with auto loading devices, the general condition of same must be such that they are fit for grain loading or better in order to be entitled to protection under Section (12) (b) of Interchange Rule 32 where loaded with contaminating commodity.

209-Q—What portion of Rule 4 governs the matter of responsibility for holes cut in end slope sheets of hopper cars with torch for the purpose of draining water from car when loaded with sand?

A—The sloped portion of single sheet of hopper car comprising both end and slope sheet shall be considered in the same category as a floor sheet and be governed by Paragraph (e) (2) of Interchange Rule 4 insofar as the issuance of defect card is concerned.

210-Q—Is the term "proper data" as used in Interpretation No. 4 of Rule 2 intended to include information with respect to the dimensions of loads exceeding the published clearances of roads over which such shipments are routed?

A—No.

211-Q—When mechanically refrigerated cars are light-weighed, should the light-weight stenciling be based on empty or loaded fuel tanks?

A—The light-weight stenciling of mechanically refrigerated cars must be based on cars having empty fuel tanks.

212-Q—Is it possible for the car owner to obtain protection under the Interchange Rules where car with questionable light-weight applied by a foreign road arrives home and such car is re-light-weighed by owner and found to actually have a light-weight considerably at variance with that shown on the car?

A—It is the intent of Interchange Rules 30 and 31 that light-weighing of cars under the provisions of these rules be done in such manner that the actual light-weight of car is determined and properly stenciled on the car. If this is not done, the car owner should secure joint evidence per Rule 12, the same as for any other wrong repairs.

213-Q—Is labor charge permissible where center plate is applied and secured with bolts in place of rivets standard to car?

A—Labor charge for jacking car is not permissible in connection with renewal of center plate secured by bolts when jacking was performed only for the purpose of renewing center plate. In cases where jacking is performed at same end of car in connection with other owner's defects and center plate is renewed and secured by bolts, full jacking charge is permissible.

214-Q—In a case where two cars are jammed together and one or more wheels of one of the cars involved are suspended above the rails and then drop back on the rails when cars are subsequently pulled apart, does this constitute a derailment under the provisions of the Interchange Rules?

A—No.

215-Q—In establishing allowances under Items 110-A and 109 of Rule No. 101, what consideration was given to the bolts which secure the items involved to the car?

A—Charges as shown in Item 110-A include a material charge for lumber and bolts as well as a labor charge for two bolts. No additional material charge is permitted for bolts passing through bracket, board and car. Item 109 of Rule 101 does not provide a material charge for bolts applied, but merely a charge for lumber plus labor charge for two bolts.

216-Q—Is additional labor charge permissible for R. & R. of bolts in brake beam sliding chair castings in connection with brake beam applied, it being understood that the regular labor charge is made for application of brake beam?

A—No additional labor charge is permissible for short bolts in sliding chair castings in connection with the R. & R. or R. of brake beam.

217-Q—Are the Dresser pipe fittings as shown in Items 101-C to 101-E, inclusive, proper substitutes for the Wabcoseal fittings as covered by Items 101 to 101-B of Rule 101.

A—Yes.

24-RL Brake Equipment

This is a new series of Questions and Answers pertaining to recent developments in the 24RL air brake equipment for road locomotives. The first questions will deal with the Pressure Maintaining feature. Authorized persons may obtain information on this subject in Instruction Pamphlets 2606-1, and 2601-1 Supplement 1 by communicating with their nearest Westinghouse Air Brake representative.

R70-Q—What is accomplished by this upward movement of the piston assembly?

A—The plunger contacts the equalizing discharge (exhaust) valve *(742)* holding it unseated.

R71-Q—With the valve unseated, what flow of air takes place?

A—Brake pipe air flows past the open valve to passage *15*.

R72-Q—Explain the flow of air further.

A—Passing through a choke, brake pipe air flows into passage *16* which is connected to the exhaust passage by a port in the rotary valve seat.

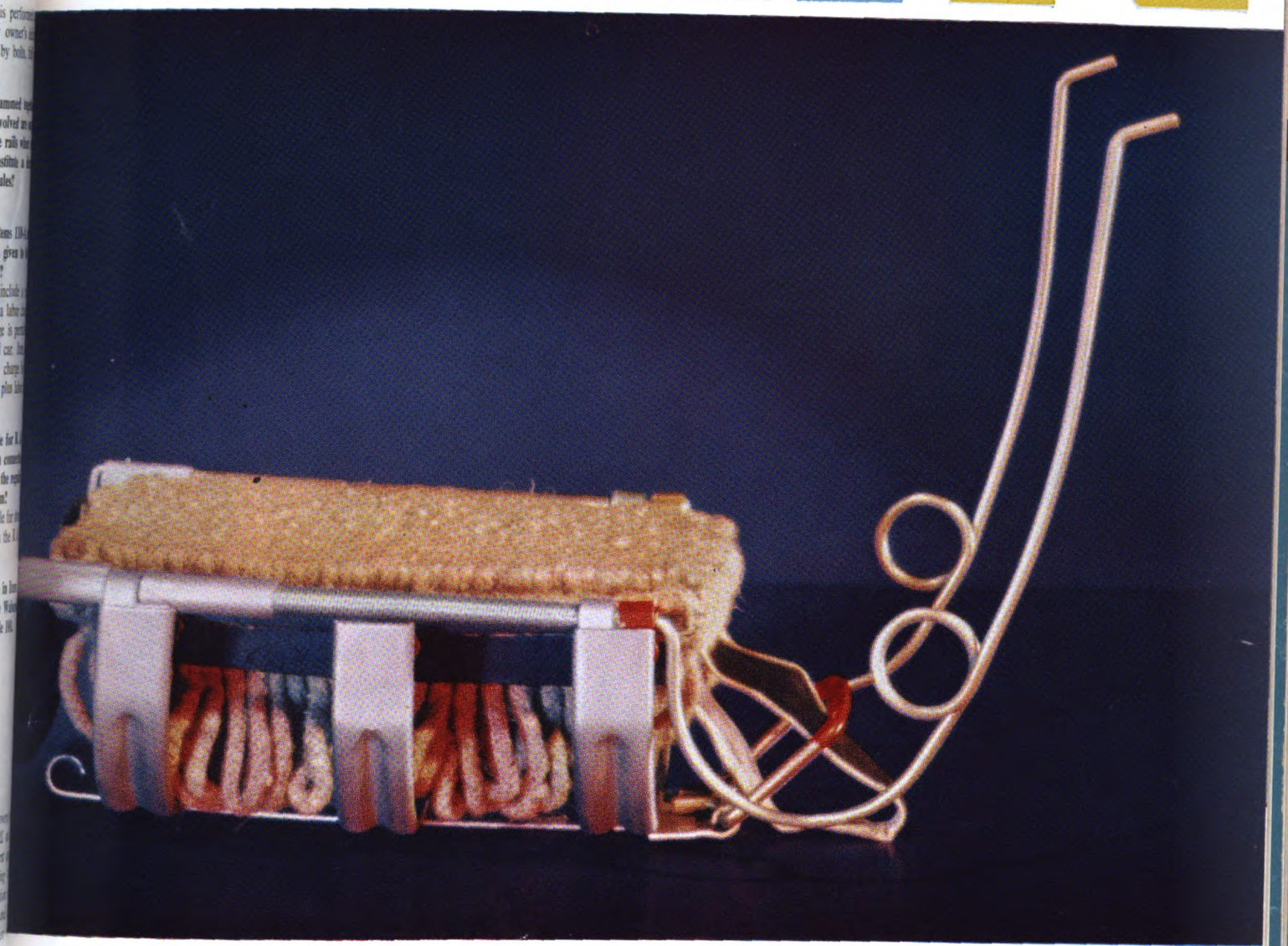
R73-Q—What is the purpose of the choke between passages 15 and 16?

A—To restrict the air flow so that brake pipe as well as equalizing reservoir and chamber *D* pressure is reduced at a controlled rate.

(Continued on page 80)

THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

ROLIN



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QUESTIONS AND ANSWERS

(*Continued from page 78*)

R74-Q—What must be done when the equalizing reservoir pressure, as shown on the gauge, is reduced the desired amount?
A—The brake valve handle is moved to *LAP* position.

R75-Q—Does all air flow cease at this time?
A—No. Further flow of equalizing reservoir pressure stops because the rotary valve connects passage *16* to the exhaust in *LAP* position. Air continues to discharge from the brake pipe until the pressure under the equalizing diaphragm has fallen to a point slightly lower than chamber *D* pressure.

R76-Q—What then takes place?
A—The diaphragm and piston assembly will be moved down to normal position and allow the equalizing discharge valve to close, cutting off further exhaust of brake pipe pressure.

R77-Q—Is the time involved in the closure of the valve the same in all cases?
A—No. The piston movement is influenced by the rate at which the brake pipe is reduced, therefore the valve will close more slowly with a long train than with a short one.

R78-Q—What is determined by the amount of reduction in equalizing reservoir?
A—The amount of brake pipe reduction regardless of the train length.

R80-Q—Why is it necessary to stop this discharge gradually?
A—To prevent the brake pipe pressure at the head end of train being built by the air flowing from the rear, which action might cause some of the head brakes to kick off.

R81-Q—For a given reduction, does the time required for the brake valve handle to be held in service position vary according to various train lengths?
A—No. The time is the same regardless of train length.

R82-Q—With the brake valve handle now in LAP position and the maintaining cut-off valve position in IN position, how will the equalizing portion operate?
A—To maintain a constant brake pipe gradient for any permissible amount of brake pipe leakage.

R83-Q—Explain the maintaining operation when brake pipe leakage exists.
A—When brake pipe pressure beneath the equalizing diaphragm becomes less than that in chamber *D*, due to leakage, the diaphragm assembly will move down, the stem contacting the maintaining valve *(722)*, holding it open.

R84-Q—What action then takes place?
A—Feed valve air from passage *14a* (from maintaining cut-off valve) will flow through the strainer, maintaining supply choke, and open maintaining valve to brake pipe passage *2b*.

R85-Q—How long will this flow of air continue into the brake pipe?
A—Until brake pipe pressure beneath the equalizing diaphragm has been built up sufficiently to cause the diaphragm piston assembly to move upward.

R86-Q—What action results from this upward movement?
A—The choke size is adequate to maintain against valve, allowing it to close.

R87-Q—What limits the rate of feed valve pressure flow available for maintenance of brake pipe leakage?
A—The maintaining supply choke.

R88-Q—Approximately, what is the capacity of this choke?
A—The choke size is adequate to maintain against 5 psi per minute leakage after a 15 psi reduction on a 150 car train.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W208-Q—How is the equalizing reservoir volume connected in the Emergency position?
A—Cavity *y* also connects *C* and *H* to the exhaust port, allowing air in chamber *D* and in the equalizing reservoir to escape to the atmosphere.

W209-Q—How is the rapid reduction of brake pipe pressure reflected at the distributing valve?
A—This reduction, as such, takes place so much more rapidly than during a service application that the air pressure in the pressure chamber of the distributing valve moves the equalizing piston *26* to its extreme position at the right, sealing against the gasket and compressing the equalizing piston graduating spring.

W210-Q—What ports are connected when the piston moves to the extreme right?
A—Port *h* in the slide valve seat is uncovered, making a direct opening from the pressure chamber to the application cylinder only.

W211-Q—What results from above action?
A—The pressure chamber and application cylinder volumes rapidly become equalized.

W212-Q—What further action takes place to insure that the equalizing piston is being held in emergency position?
A—Main reservoir air is permitted to flow through a restricted opening. It proceeds through port *a* and cavity *j* (in the rotary valve of the automatic brake valve) and port *2* (in seat) into application pipe and application cylinder.

W213-Q—What is the equalization point between the pressure chamber and the application cylinder?
A—At 70 lb (low pressure service), they equalize at about 65 lb.

W214-Q—What other connection has been made to the application cylinder at this time?
A—The application cylinder is connected to the safety valve through port *h2* (in the seat), cavity *q* and port *r* (in the equalizing slide valve) and port *l* (in he seat).

W215-Q—How are the port sizes proportioned?
A—Cavity *q* and port *r* are connected by a small port. Its size is proportioned to the size of the maintaining port in the automatic brake valve. As a result, air flowing from the main reservoir to the application cylinder escapes through the safety valve at a rate which limits brake cylinder pressure.

W216-Q—Will the brake cylinder pressure equal that of the main reservoir?
A—No. It will be considerably higher than that obtained from a full service application.

W217-Q—How does the application portion respond to the emergency action described above?
A—The application piston is moved promptly to the right, opening the application valve fully, producing a fast build-up of brake cylinder pressure.

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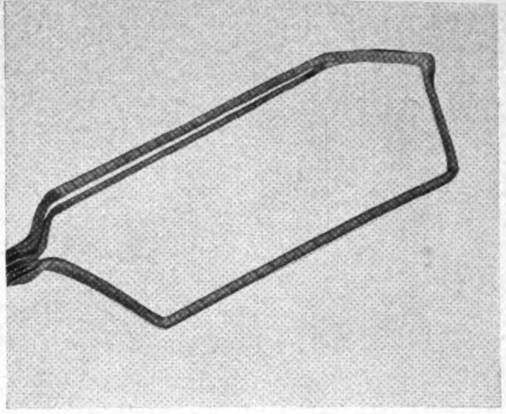
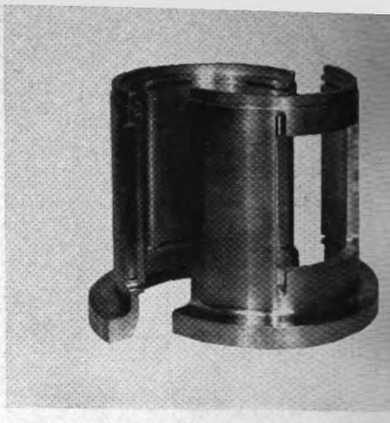


2 ARMATURE COILS are available as part of complete rewind kits. Every coil is dimensionally accurate, quality insulated for longer life.



3 MOTOR SUSPENSION BEARINGS give longer service life, have built-in oil-return feature for savings up to $85 of operating costs per locomotive unit, each year.

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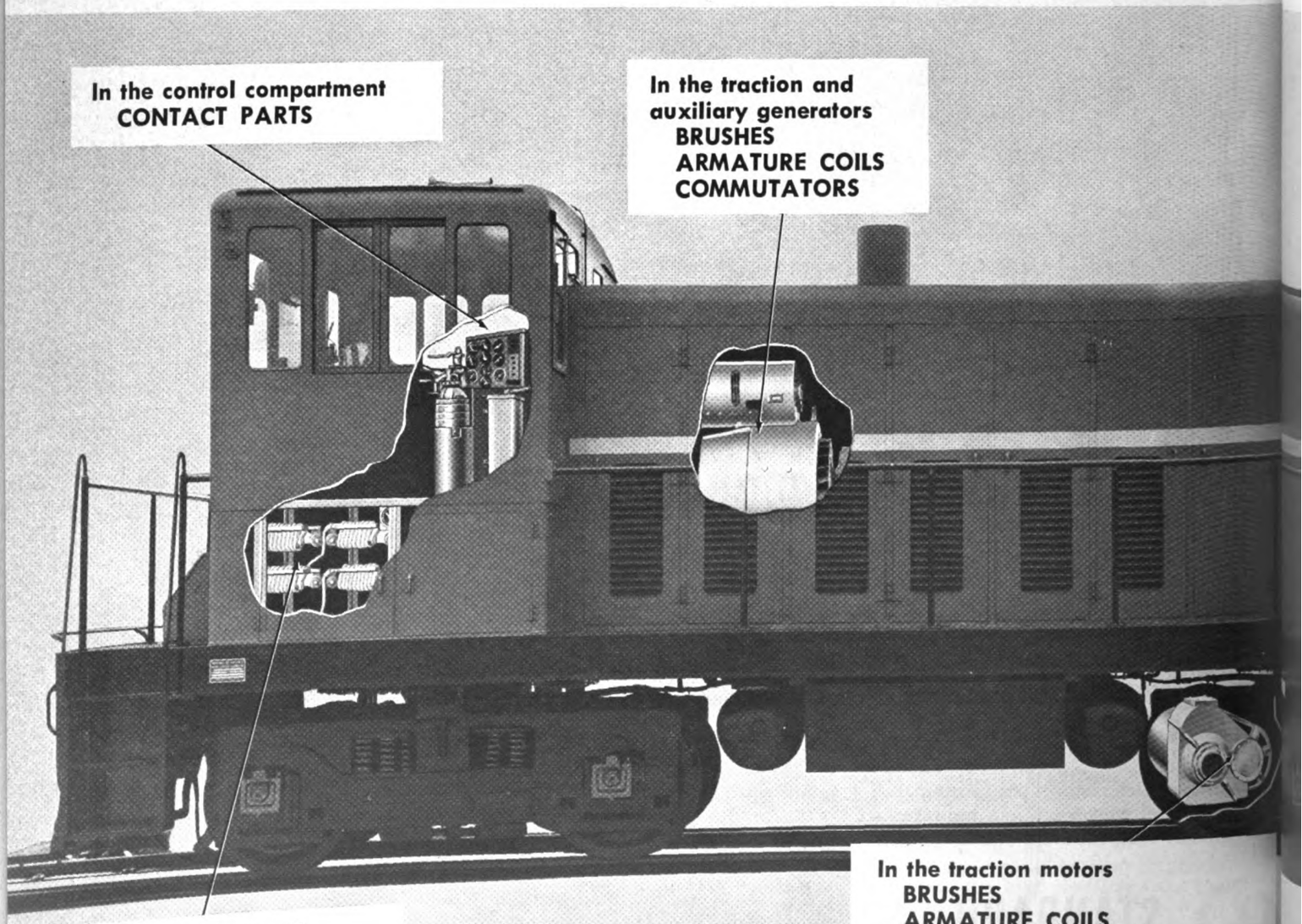
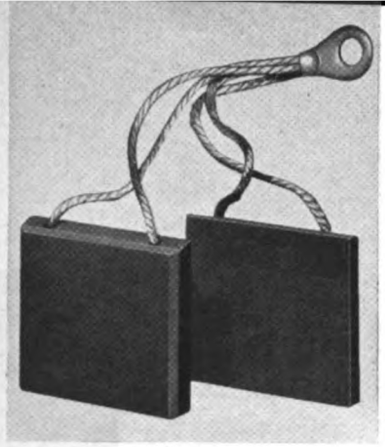
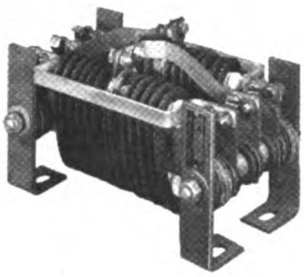


4 CONTACT PARTS break circuits quickly with minimum metal transfer, giving long service life from these parts.



5 RECOMMENDED CARBON BRUSHES, selected for proper degree of hardness and grain structure, minimize wear and tear on commutator surfaces.



6 RESISTORS have floating steel backbones that expand, contract freely with high temperature changes, therefore are not subject to harmful bucking forces.

7 COMMUTATORS, seasoned by high speed, high temperature process, wear longer and retain smoothness.

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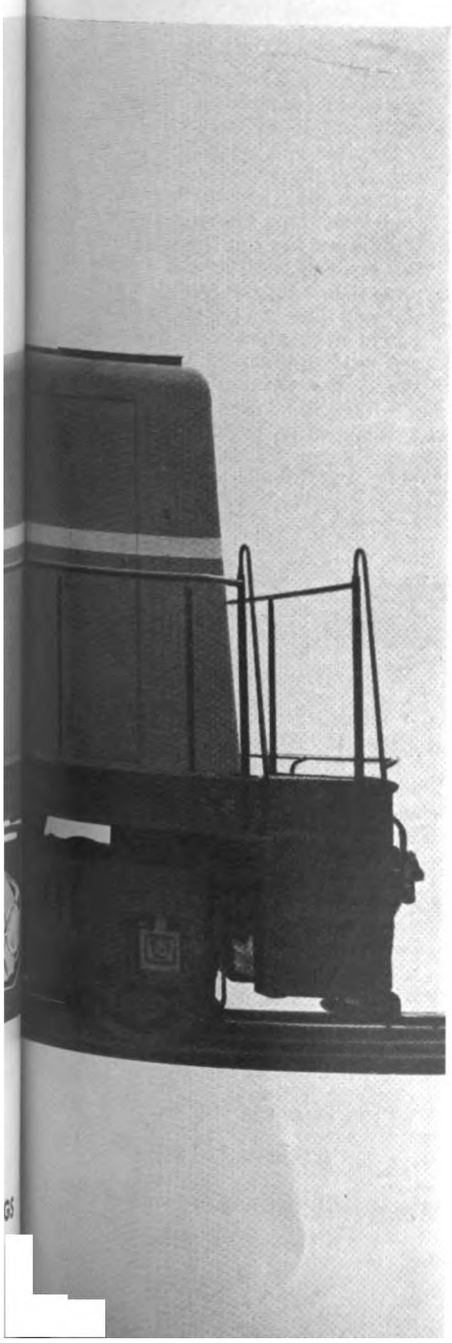

Seven key parts are vital to the steady, dependable performance of your locomotive electrical equipment. That's why when you replace these key electric parts in your General Electric equipped locomotives, you'll want only G-E parts to help you keep all the power that you originally bought.

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Progress Is Our Most Important Product

GENERAL ELECTRIC

(*Continued from page 10*)

needed. These are changed as the lapping operation is switched from coarse to fine and vice versa.

Lapmaster lapping machines are capable of generating surface flatness to less than one light band, and finishes to 2 RMS on parts such as diesel engine cylinder heads. *Crane Packing Co., Dept. RLC, Morton Grove, Ill.*

Degreaser

Armoreze, a degreaser for car journals, machinery, diesel gears and parts, has a chemical formula similar to that used in fire extinguishers. It is packaged in a push-button spray type container for convenient use.

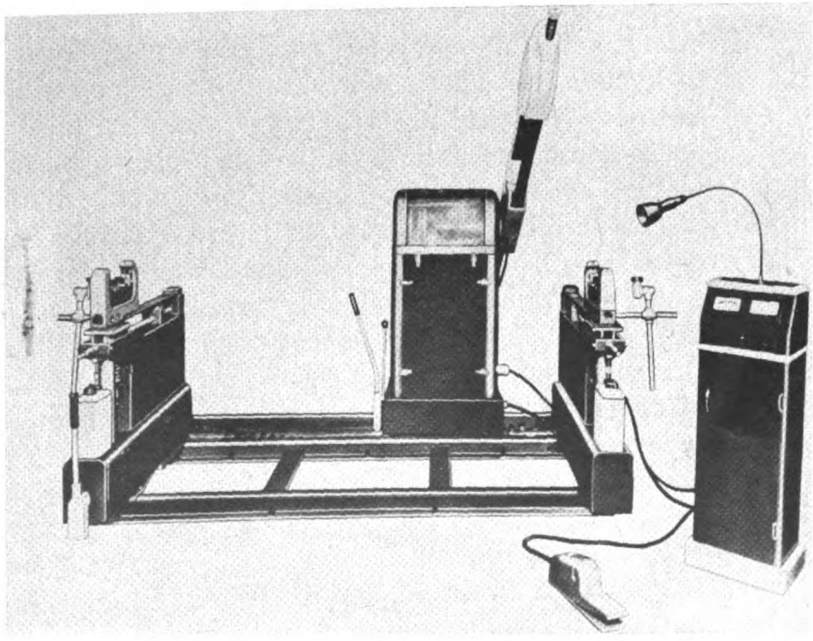
This product is especially useful at outside points on railroads, where steam cleaning is not available, for removing protective grease coating from car journals. According to the manufacturer, after the contents have been sprayed on, and allowed to set for 2 or 3 min, the coating can be easily wiped off. One pint can, it is said, will clean approximately 10 pair of wheels. *Plastic Armor Company, Dept. RLC, P. O. Box 761, Sherman Oaks, Cal.*

Plastic Coating

Insulcote is an emulsion type plastic coating, light tan in color, used for insulating galvanized metal box car ceilings. According to the manufacturer, it prevents condensation of moisture vapors during cold weather and is impervious to mineral solvents and fumes from treated lumber. Preliminary acid treatment of galvanized surfaces is not necessary before application.

This material can be applied with conventional heavy duty spray equipment, with a recommended minimum thickness of 3/16 in., and at a temperature not lower than 50 deg.

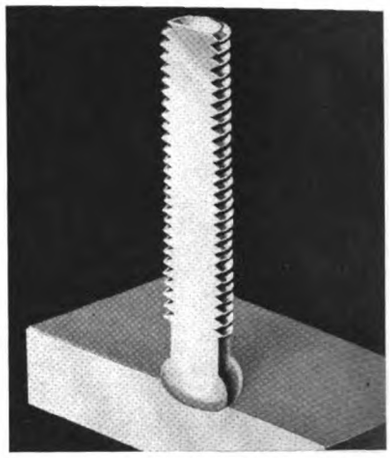
Insulcote is available in 5-gal pails and 55-gal drums. *Frost Paint & Oil Corp., Dept. RLC, 1209 Northeast Tyler, Minneapolis 13.*



Electronic Balancers

The Stewart-Warner electronic industrial balancer illustrated (Model 708) provides a weight range of 1 lb to 5,000 lb and a diametral range from 1 in. to 68 in. and a length range of 7 in. to 83 in. between bearing surfaces. Extra length is readily obtainable. It has sensitivity of .04 in.-oz. Another, (Model 704), has a weight range of from 8 oz. to 1,000 lb, a dimetral range of from ½ in. to 44 in. and a length range from 4½ in. to 55 in. between bearing surfaces. Sensitivity of .01 in.-oz.

Distribution of the Stewart-Warner line of electronic industrial balancing equipment, formerly marketed by Merrill Engineering Laboratories, Denver, Colo., is now being handled by the company through a special department headed by Ralph Buscarrello. *Stewart-Warner Corporation, Dept. RLC, 1826 Diversey Parkway, Chicago 14.*



Welding Studs

The KSM welding stud has a solid flux centered in the welding end of the stud. The bond with the surface to which the stud is fastened utilizes the stud's entire cross-sectional area to form a complete bond instead of merely joining the sides of the stud to the base surface. This weld is said to be stronger than the stud, and maximum strength and resistance to shear and torque are achieved.

Portable and production arc welding units for the application of these studs are available. The portable gun holds the stud away from the surface while creating the welding arc. The stud is held in this position until the stud ends and the plate below become molten. A spring in the gun then forces the stud into the parent work plate where it fuses. Standard welding generator and rectifiers can supply the necessary d-c current.

In addition to the externally threaded welding studs, unthreaded pins and internally-threaded welding pads are available. *KSM Products, Inc., Dept. RLC, Merchantville 8, N. J.*

Welding Electrode

A manual arc, general purpose, welding electrode, AWS E6013, is of heavily coated mild steel, for a-c or d-c operation in all positions. The moderate arc force gives adequate penetration, according to company engineers, the steady spray type transfer controlling the deposit.

Molten deposit is said to spread easily, producing welds with uniformly feathered edges and good shape. Its suitability to welding down in vertical fillets is a featured item. The combination of toughness with ductility found in the metal deposit is offered as an additional asset.

Tests made to AWS specifications showed these physical properties: 3/16-in. diameter electrode—76,400 tensile psi, 65,100 to 67,900 yield psi, 27 per cent

(*Continued on page 86*)

HELPING TO KEEP YOUR ROLLING STOCK SAFE

You Can Inspect Diesel Axles
WHENEVER THE ENGINE IS STOPPED

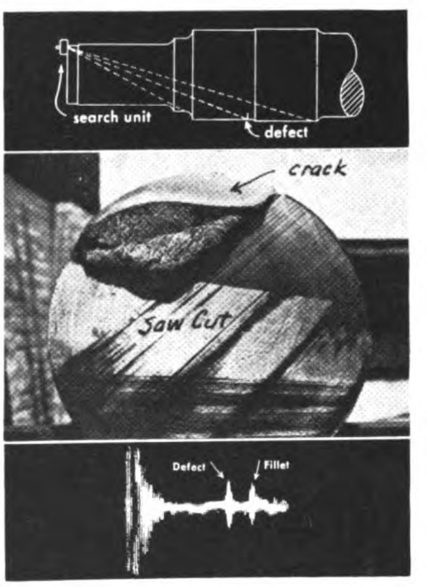
Today the regular and *frequent* testing of diesel axles is more important than ever before. Higher speeds, heavier loads and more of them, place a great burden upon motive power. That is why complete maintenance programs emphasize *frequent* inspection of vital components to assure their soundness and maintain a high availability level. The Sperry Ultrasonic Reflectoscope can be an invaluable asset to such a program.

Fast, simple and accurate, the Reflectoscope tests diesel axles, *in place under the engine*—whenever and wherever the engine is stopped. For regular inspection this simple and searching method easily fits into periodic maintenance schedules—to provide axle inspection while wheel-truing, for example. By detecting and

locating flaws before failure occurs, Reflectoscope inspection helps prevent costly breakdowns, assures maximum equipment utilization and offers immediate maintenance economies.

HOW REFLECTOSCOPE "FINDS THE TRUTH"

The Reflectoscope projects a *narrow beam* of ultrasonic sound waves through the axle. Any defect encountered by the sound beam reflects back to the Reflectoscope and is pictured on the cathode ray tube. The Reflectoscope not only finds the defect, it shows where it is.



For diesel axle testing, special search units are used. These units project beams at an angle instead of in a straight line. Angle beam search permits testing of fillets and similar critical areas which cannot be reached by a straight beam search unit.

Discovering flaws in the pre-failure stage is "low-premium" insurance against equipment failure and the losses this could entail. Reflectoscope testing is one of the surest, most economical ways to "keep 'em rolling." Your Sperry Sales Engineer will be glad to give you the complete Reflectoscope story for complete maintenance programs. Or, detailed literature is yours for the asking.

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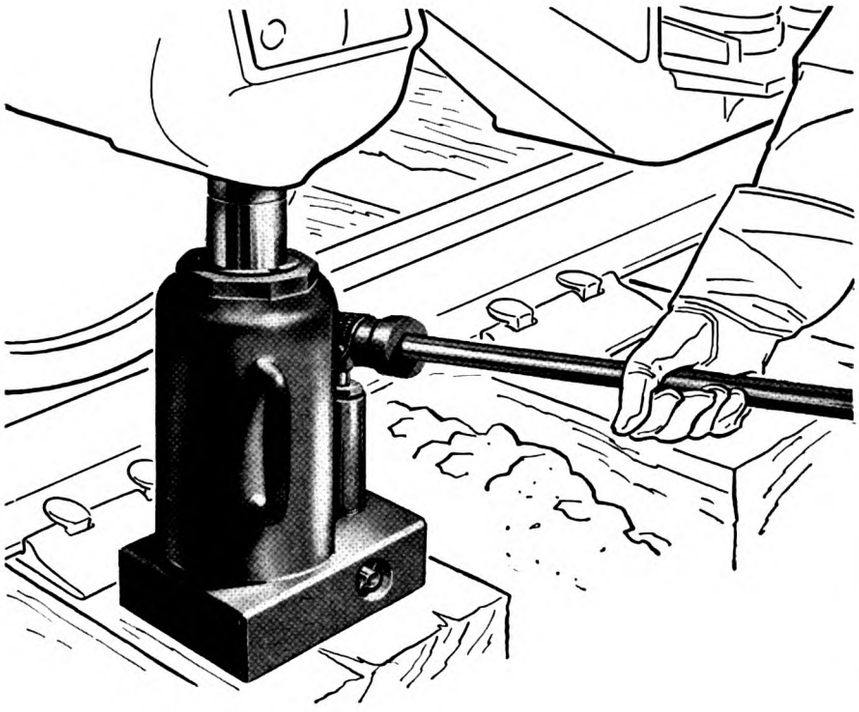

NEW! A 35 Ton Hydraulic Journal Jack

First in the Industry!

You asked for it and here it is—a brand new jack designed and built especially for servicing heavier freight cars. It can raise 35 tons 6 inches—is only 9.7 high—weighs but 55 pounds. With the 35H9.7, the job of inspecting and renewing journal brasses can now be done without the danger of overloading a lower capacity hydraulic journal jack—and the work can be done faster with less effort! If you have the problem of lifting heavy cars, we suggest you get complete details on this new 35 ton hydraulic journal jack immediately. Write the world's oldest and largest manufacturer of lifting jacks for bulletin AD29-G.

Duff-Norton Jacks

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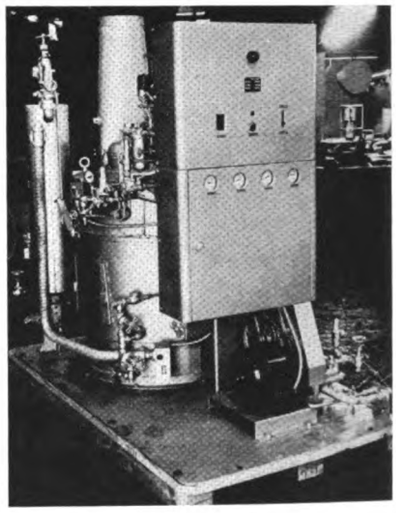
Rachet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Rachet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

EQUIPMENT

(*Continued from page 84*)

elongation. ¼-in. diameter electrode—72,400 to 73,500 tensile psi, 62,900 to 62,400 yield psi, 28.5 per cent elongation. Charpy v-notch impact value of 33 ft-lb was obtained at 0 deg F. *Welding Dept., General Electric, Dept. RLC, Schenectady 5, N. Y.*



1,750-lb. Steam Generator

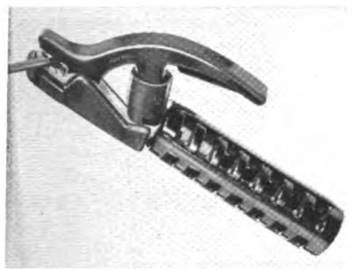
From 60 deg feed water, the Vapor Modulatic steam generator Model 4615 produces 400 to 1,750 lb of steam per hour at 75 to 300 psi. This generator has 99 sq ft of heating surface and is rated at 60 bhp.

Automatic controls cause the steam generator to cycle on and off and change the volume of steam produced to meet a changing steam demand. The servo-water-bypass-control meters the fuel, feed water and combustion air. Working steam pressure is changed from 75 to 300 psi by turning one control.

The 4615 steam generator is 84-in. long, 48-in. wide and 70-in. high. The 337 ft steel coil is designed so that hot gasses, wipe over and around the loops to transfer heat to the water being pumped through the coils under pressure. A steam separator removes excess moisture. Three burners are available—one for No. 2 fuel oil, one for natural gas, and a combination burner for oil or gas. Fuel may be changed by flipping one switch and without changing any parts.

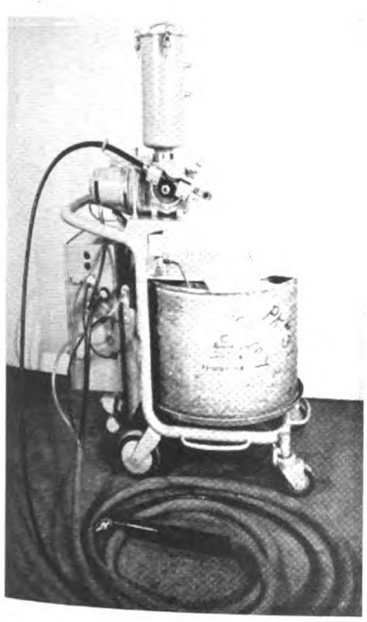
The protective controls are steam temperature limit, low water cut out, electric eye, safety valve, motor overload cut out, atomizing steam or air combustion switch cutout and excessive water pressure relief valve. The 4615 Modulatic steam generator is a complete package which includes a 3-hp electric motor, blower, feed water pump, steam separator, fuel pump and panel mounted

controls all assembled on a steel base. *Dept. PR-57, Vapor Heating Corp., Dept. RLC, 80 E. Jackson Blvd., Chicago 4.*



Electrode Holder

A tong-grip electrode holder, which will deliver 300 amp on a heavy duty cycle when connected to a 2/0 cable, has been made available. It weighs 17 oz and features all glass insulators. It has a spring cup and a slip-on insulator with no screws or rivets. No current is carried in the hinge pin or upper tong. A wedge cable connector makes a tight and permanent connection. The holder has only nine parts and can be assembled or disassembled in a few seconds. *Martin Wells, Inc., Dept. RLC, 5886 Compton ave., Los Angeles 1, Calif.*



Continuous Welding With Magnetic Flux

Unionarc welding is a manual arc welding process embodying a continuously-fed wire electrode which is magnetically coated with flux and shielded in a gas atmosphere. At the present time, this process is being used to produce high-quality welds in steel. The manufacturer states that it can be used in all positions at greater speeds and lower costs than covered electrodes.

A bare wire electrode of common steel

NEW *Utility* PRESS BY

FJELLMAN AMERICAN

for Forcing, Bending, Forming, Drawing up to

200 TONS

ONLY 8'7" D. x 4'5" W. x 11'3" H.

Here's a unique, compact press — ideal for custom forming where pressures up to 200 tons are required — with infinitely variable pressure-control. Its goose-neck design, 300° loading arc, high throat and long, exacting stroke make the Fjellman American utility press an extremely versatile machine for your custom production and repair department assignments.

FJELLMAN AMERICAN, INC.

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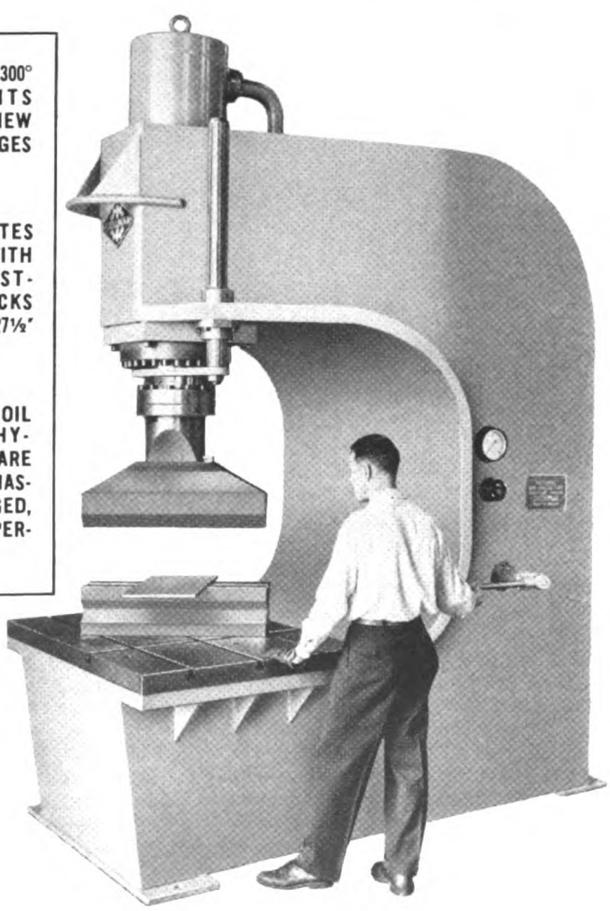
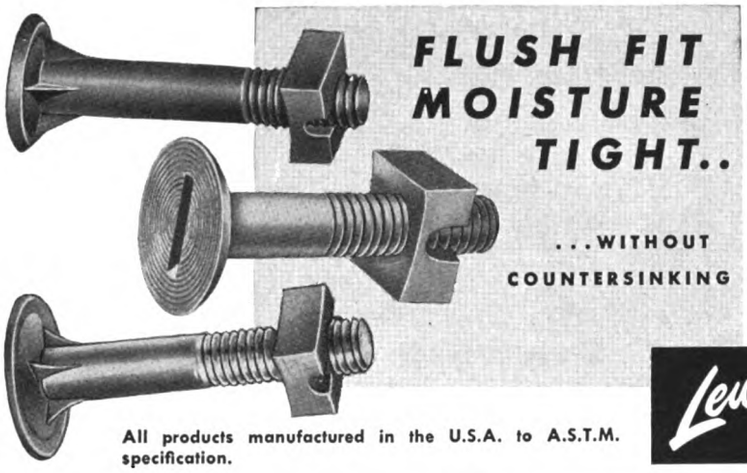
▶LOADS THROUGH A 300° OPENING. PERMITS OPERATOR FULL VIEW OF WORK AND GAUGES EVERY MOMENT.

▶PRESSURE REGULATES IN AN INSTANT WITH FINGERTIP ADJUSTMENT. PISTON LOCKS ANYWHERE WITHIN 27½" STROKE.

▶TWO-STAGE PUMP, OIL RESERVOIR AND HYDRAULIC SYSTEM ARE HOUSED WITHIN MASSIVE FRAME. RUGGED, CLEAN, EFFICIENT OPERATION.



Write for complete data and specifications



Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

composition is continuously-fed from a 300-lb capacity pack through a flexible tube to the torch. The operator starts and continues welding to suit his requirements. Frequent stopping to change electrodes is unnecessary. The wire pack is supported and rotated on a motor-driven turntable, controlled so that wire tension at the feed rolls is minimized. The large wire pack provides at least one week's supply with average welding conditions.

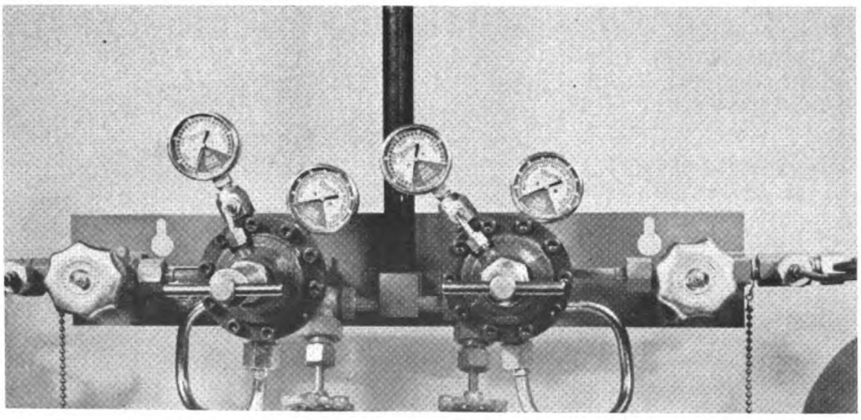
Magnetizable flux is placed in a dispenser and fed from this point through a flexible tube to the torch. The dispenser is designed to measure out exactly the quantity of flux required for the amount of wire that is being fed. The dispenser can be adjusted to feed different flux-to-wire ratios, but the usual ratio is between ⅜ to ½ lb of flux per lb of wire. This predetermined ratio is automatically maintained regardless of the rate of wire feed.

The flux is fluidized at the dispenser in a stream of welding-grade carbon dioxide gas. The gas, supplied from the usual commercial containers, is regulated as to pressure and flow and carries the flux to the torch suspended in the gas stream.

At the torch nozzle, the magnetic field created by the electric current passing through the wire, magnetizes and attracts the flux to the wire. As a result, the wire is coated as it is fed into the arc. The flux melts and serves, together with the shielding gas, to stabilize the arc and the stream of molten metal passing through it to the puddle, and to protect the puddle from atmospheric contamination; to refine the molten metal by deoxidation; to provide the desired control of weld contour by its effect on surface tension; and to provide the desired cooling rate of the weld metal by its blanketing and insulating action.

The welding current is supplied by a direct current power source. The arc characteristics of Unionarc welding are similar to those of covered electrode welding. The small amount of spatter produced is not tenacious, and can be removed by wiping or light brushing. Manual skill and dexterity requirements are equivalent to, or are less than, those for covered electrode welding.

The sequence of starting and stopping the flow of current, wire, flux and gas, as well as the maintenance of proper welding conditions, is regulated through an electronic control unit. The torch is rated at 450 amp continuous duty. *Linde Air Products Company, a Division of Union Carbide and Carbon Corporation, Dept. RLC, New York.*



Multiple Manifold

The Oxweld M-35 oxygen cylinder manifold is designed to handle an unlimited number of cylinders. Basically, the manifold accommodates two cylinders, one on each side of the operating controls. Straight or curved extensions are then added in single or double rows to either bank, to manifold any number of cylinders. The unit was developed to supply any amount of oxygen to a piping system for welding, cutting or other uses.

One bank of cylinders can be operated independently while those in the other bank are in reserve or being changed. Both banks may be operated simultaneously. In alternate operation, the reserve cylinder bank automatically picks up the oxygen load when the supply in the operating bank is used. This makes it possible to leave the manifold completely unattended until all cylinders are exhausted.

Units similar in operation to the M-35 are available for water or oil-pumped inert gases, such as argon, nitrogen, and helium; for high-pressure fuel gases, such as hydrogen and methane; and for liquefied petroleum gases, such as propane, butane, and pyrofax. *Linde Air Products Company, Dept. RA, 30 East 42nd st., New York 17.*

Contour Saw

The DoALL Model 5 band saw operates on the stationary work-piece, moving-tool concept of contour sawing. This is proposed as a better arrangement with heavy, ungainly or unbalanced material. The saw has a work capacity of 70 sq ft and will produce straight cuts 14½-ft long. Stacking of large, off shaped parts to be sawed is another application of this machine.

Contour sawing is thought the best method to make aperture cuts, especially if a large volume of unwanted material must be removed in usable pieces. With this machine the resulting surface has dimensional accuracy, good finish, and is free from surface hardening and flash that impedes further machining, say the

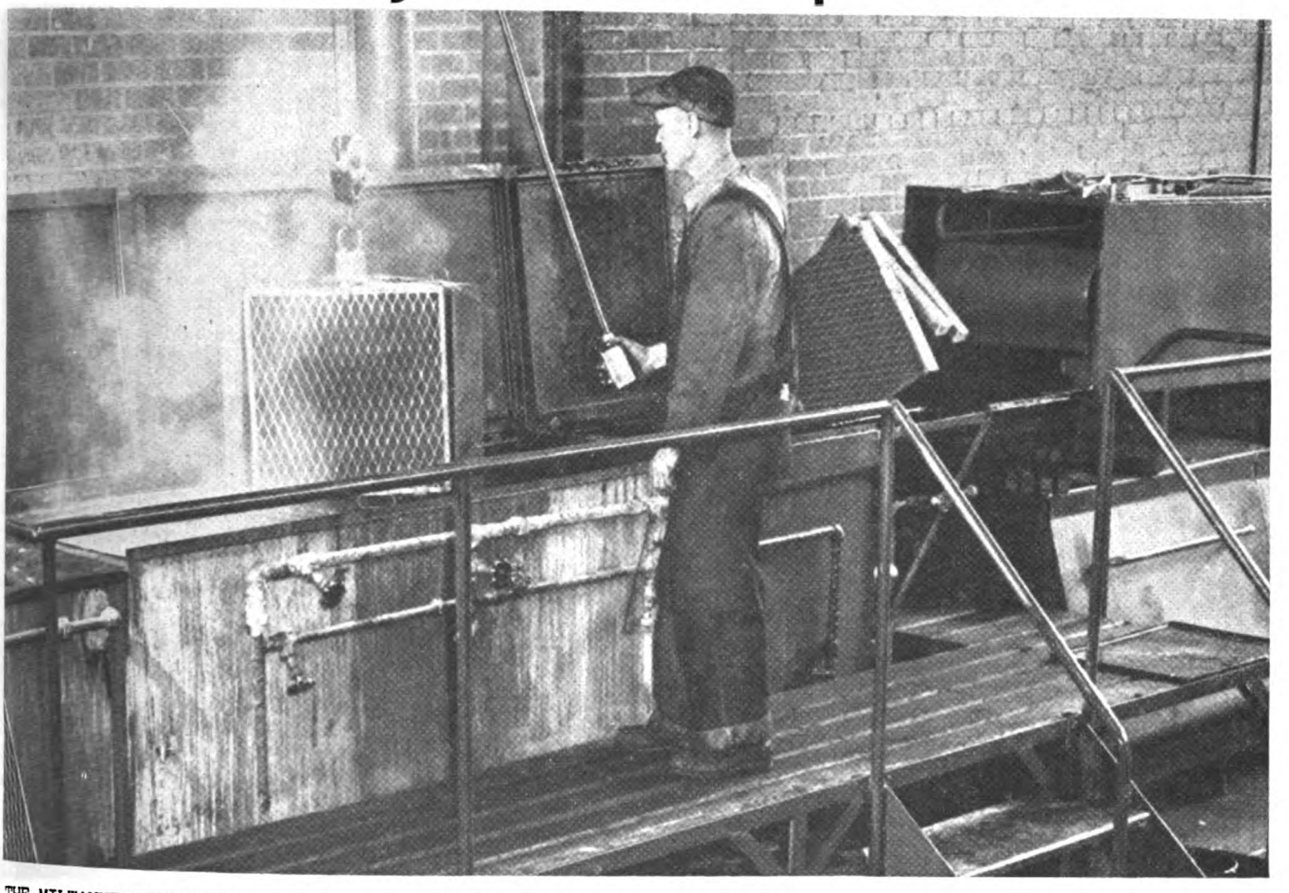
(Continued on page 92)

ENGINEER'S FIELD REPORT

PRODUCT CHEVRON* FILTER COAT

FIRM MILWAUKEE R.R.
Seattle, Washington

Special adhesive coating increases efficiency of filters up to 50%

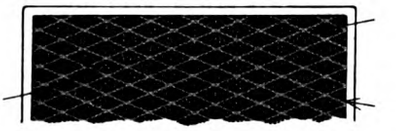


THE MILWAUKEE ROAD has found Chevron* Filter Coat increases the efficiency of its air filters as much as 50% compared to the oils they previously used—according to the District Diesel Supervisor. They have used this product on impingement-type car-body and engine-air filters since 1953, when it was first introduced.

To service the great number of filters in use, the railroad installed a special production line. Process starts with a thorough steam and chemical cleaning of filters. They are then dipped (above) in heated Chevron Filter Coat. After draining 15 minutes, filters are placed in drying ovens.

Chevron Filter Coat gives complete protection not only against heavy dirt and dust, but also grit from sanding. Even under adverse operating conditions, Chevron Filter Coat does not drip off screens, but maintains its high wicking ability, and keeps dust and grit out of engines.

Why Chevron* Filter Coat ups efficiency of air filters



- Will not drip off screens—gives full filtering efficiency through entire service period.
- Easily applied and cleaned.
- High wicking ability—quickly soaks dust particles.

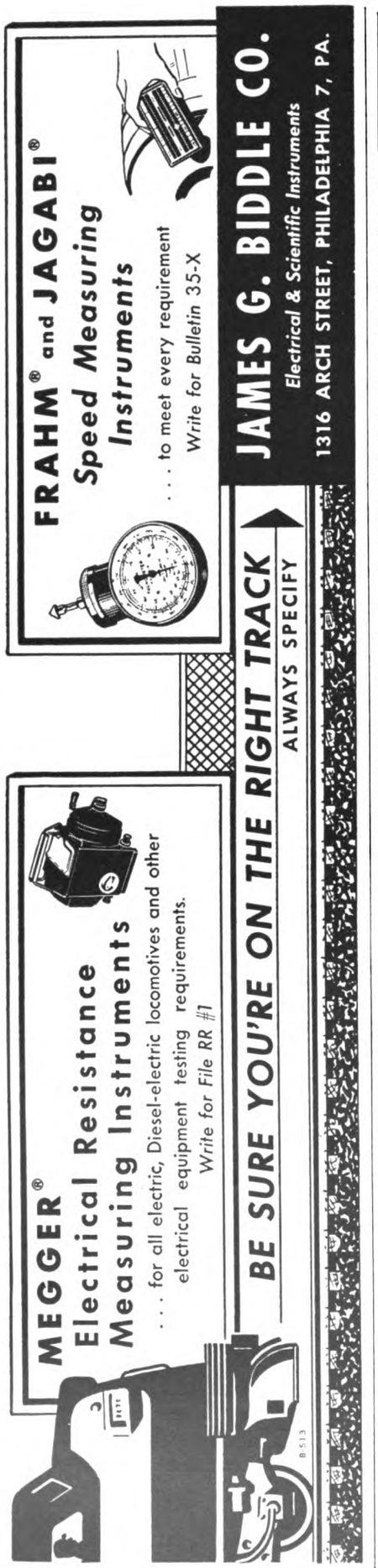
*The Chevron Brand covers the line of industrial products formerly sold under the Calol name. This is a name change only. The high quality and specifications remain the same.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND DESIGN REG. U.S. PAT. OFF.

For More Information about this or other petroleum products, or the name of your nearest distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Franciso 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey
STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado



HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

VINYL SHEETING. 4-page folder describes Masland Duran Clad, a new semi-rigid vinyl that can be laminated to sheet metal or continuous coils and then formed into product components. Includes samples in color. (Write: *Masland Duraleather Company,* Dept. RLC, Philadelphia 34, Pa.)

ELECTRODE DATA. 24-page book (NH-504) includes information on AWS-ASTM arc welding electrode specifications; how to estimate electrode consumption; summary of welding symbols; factors in selecting electrodes, and other data for users of arc welding. (Write: *National Cylinder Gas Company*, Dept. RLC, 840 North Michigan ave., Chicago 11.)

TEFLON TUBING. Bulletin T-200 discusses electrical properties of thin-walled Teflon tubing for sheathing cables; for slip-on and sleeving insulation in motors, generators and transformers, and for instrument wiring in communications, electronics, locomotive, marine and other equipment. (Write: *Haolocarbon Division, Haveg Industries, Inc.*, Dept. RLC, 900 Greenbank Road, Wilmington 8, Del.)

FASTENERS. 4-page folder describes stainless-steel and aluminum fasteners—thread cutting screws, sheet metal screws, machine screws, cap screws, washers, bolts, nuts, etc. (Write: *Accurate Threaded Fasteners, Inc.*, Dept. RLC, 2901 Montrose Ave., Chicago 18.)

METALLIZING POWDER.—Engineering Data Sheet No. 53 discusses properties, characteristics and use of Colmonoy C-250 metallizing powder for crankshaft bearing surfaces. Includes also an 11-step application procedure. (Write: *Wall Colmonoy Corporation,* Dept. RLC, 19345 John R. st., Detroit 3.)

PORTABLE SHAPE CUTTING MACHINE. 8-page form ADC 660B describes advantages and applications of the Airco No. 4 Monograph machine. Cutting range, weights, dimensions, etc., also given. (Write: *Air Reduction Sales Company,* a division of Air Reduction Company, Dept. RLC, 150 East 42nd st., New York 17.)

SPECTROGRAPHIC EQUIPMENT. 32-page illustrated manual, No. D-277, describes complete line of B&L equipment, from basic educational units to complex instruments required by research and testing laboratories. Also announces the Analytical Planning Survey, a planning service, under which spectrographic experts will make a complete study of an organization's requirements and recommend suitable equipment on the basis of their findings. (Write: *Bausch & Lomb Optical Co.*, Dept. RLC, 635 St. Paul street., Rochester, N. Y.)

AIRCOMATIC CUTTING. 24-page Catalog 3170 describes development and applications of Aircomatic cutting for straight-line and shape cutting of nonferrous metals, particularly plates and parts to be joined by gas-shielded arc welding. (Write: *Air Reduction Sales Company,* Dept. RLC, 150 East 42nd st., New York 17.)

AIR DISTRIBUTION GRILLES. Uni-Flo Grille Catalog No. 1415-12 includes descriptive data and illustrations of supply grilles; return, exhaust and transfer grilles, and accessories; also photographs of smoke tests showing performance of this equipment. (Write: *Barber-Colman Company,* Dept. RLC, Rockford, Il.)

BRONZE VALVES. 4-page Bulletin DH-25 describes solder end and silver-braze end bronze valves in gate, globe and check designs. Includes also physical characteristics and construction details. (Write: *R-P&C Valve Div., American Chain & Cable Co.*, Dept. RLC, Reading, Pa.)

HOSE CLAMPS. Form Cat. 300RG-56, a 12-page booklet, describes Punch-Lok hose clamps, grooved hose fittings, and special tools and replacement parts. Instructions on applications also given. (Write: *Punch-Lok Company,* Dept. RLC, 321 North Justice st., Chicago 7.)

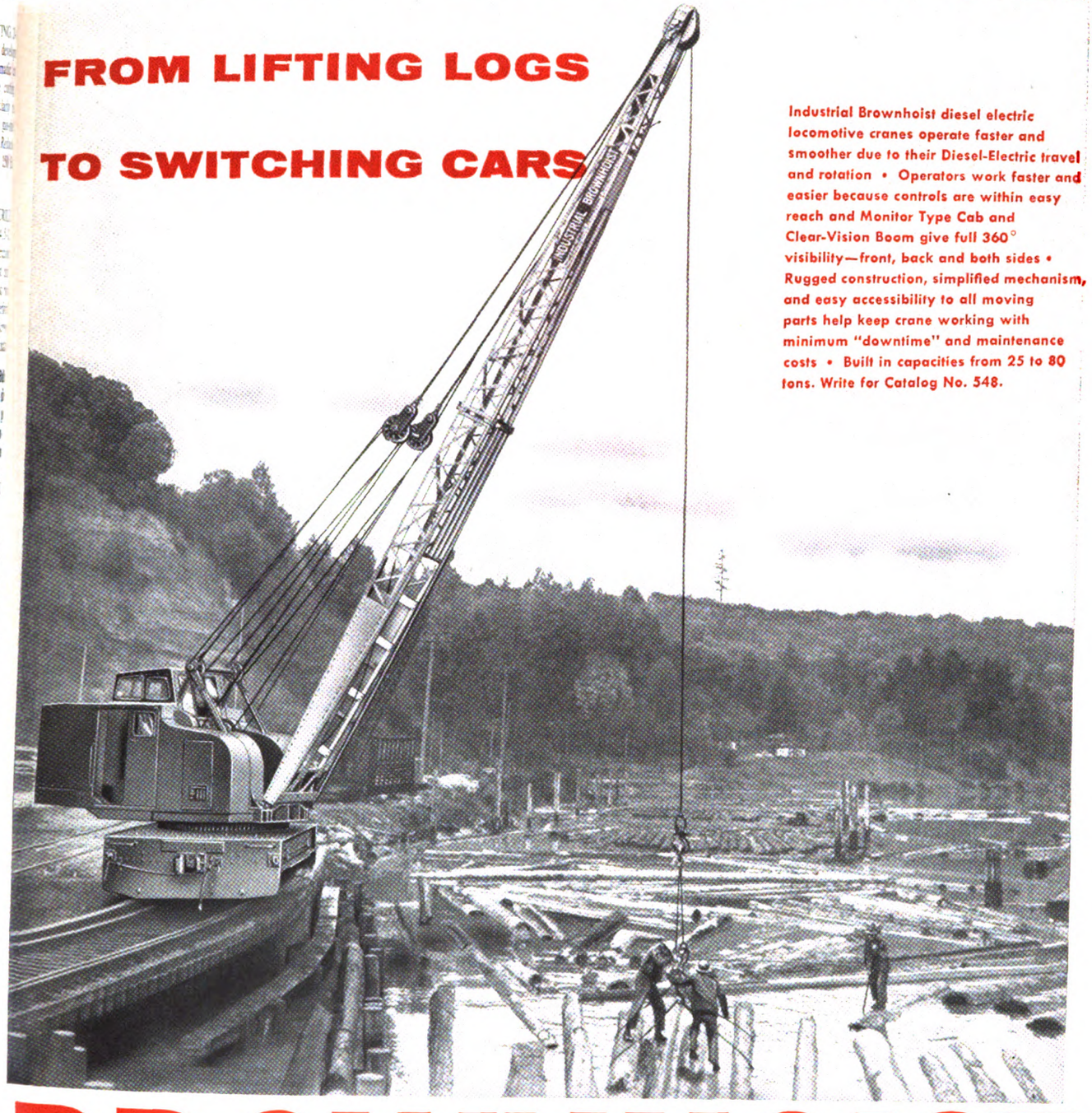
CINCINNATI MACHINES. General catalog No. M-1961 covers complete line of milling, grinding, broaching, and allied machines. (Write: *Cincinnati Milling Machine Company-Cincinnati Grinders Incorporated,* Dept. RLC, Cincinnati 9.)

"WROUGHT IRON FOR RAILROADS." 36-page booklet illustrates some outstanding mechanical and engineering railroad applications of wrought iron, including air-brake and steam piping; car charging lines; swing hangers; staybolts etc. (Write: *A. M. Byers Company,* Dept. RLC, P. O. Box 1076, Pittsburgh 30.)

PETRO-ENGINEERING SERVICE. 24-page illustrated booklet for industrial and commercial users of petroleum products tells what Petro-Engineering Service is; what it does; how much it costs; who needs it, and why. (Write: *Gulf Oil Corporation,* Dept. RLC, 1822 Gulf building, Pittsburgh 30.)

TYPE G 12 DIESEL-ELECTRIC LOCOMOTIVE. 8-page booklet describes the Type G 12 Henschel General-Motors 1,310-hp. diesel-electric locomotive. Illustrates details of construction. Curve diagram shows tractive force and speed. (Write: *Henschel,* Dept. RLC, c/o Georg J. Linder Continental European Representative, (16) Frankfurt a.Main, Wittelsbacher Allee 60, West Germany.)

WHY INDUSTRIAL BROWNHOIST LOCOMOTIVE CRANES SPEED UP JOBS FROM LIFTING LOGS TO SWITCHING CARS



Industrial Brownhoist diesel electric locomotive cranes operate faster and smoother due to their Diesel-Electric travel and rotation • Operators work faster and easier because controls are within easy reach and Monitor Type Cab and Clear-Vision Boom give full 360° visibility—front, back and both sides • Rugged construction, simplified mechanism, and easy accessibility to all moving parts help keep crane working with minimum "downtime" and maintenance costs • Built in capacities from 25 to 80 tons. Write for Catalog No. 548.

BROWNHOIST

CLAMSHELL BUCKET

250 TON WRECKING CRANE

COAL-ORE BRIDGE

CAR DUMPER

LOCOMOTIVE CRANE

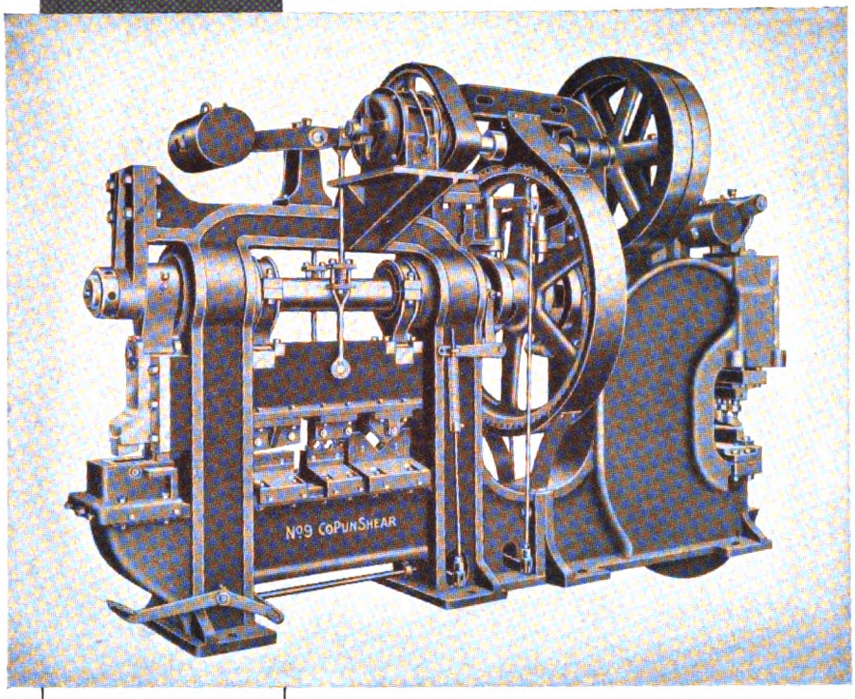
INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, San Francisco, Montreal, Canada • AGENCIES: Detroit, Birmingham, Houston

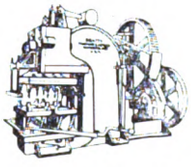
SUBSIDIARY OF Penn-Texas CORPORATION

199

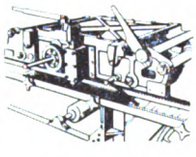
BEATTY CO PUN SHEAR

3-in-1 Machine Speeds Miscellaneous Repair Work





No. 11-B Punch



Spacing Table (SPI Type)

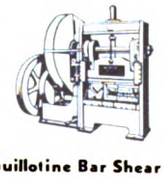
Cope — punch — shear without changing tools! This versatile combination of coping, punching and shearing tools can handle about 90% of the miscellaneous work required in the average repair shop — eliminates the time and work necessary to change tools on ordinary single-end machines. All tools are driven from a single motor and are operated with independent clutches.

Especially engineered to save time and increase output, the Co-Pun-Shear can punch three different diameter holes in one handling. Detachable shearing tool holders speed substitution of tools for special shapes; reduce down time.

Write For Full Details

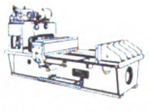
BEATTY MACHINE & MFG. CO.

962 150th St.
HAMMOND, IND.



Guillotine Bar Shear

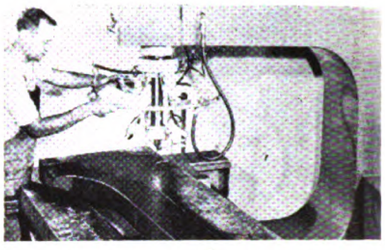
Vertical Bulldozer



Horizontal Bulldozer

EQUIPMENT

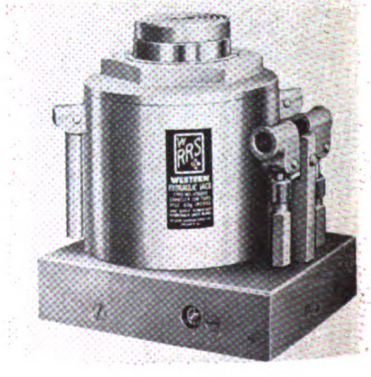
(Continued from page 88)



manufacturers. Much attention by the designers has been given to the power feeds and accessories to produce these operations.

The articulated construction of the saw was selected to achieve an extreme range and ease of handling. The power feed and cutting and guiding mechanism is carried by a yoke. The yoke, made of aluminum to reduce its inertia, is separated from the stationary floor mounted member by an intermediate unit. These three members are hinged on anti-friction bearings, providing the work capacity mentioned.

Yoke houses a 4 wheel variable speed band machine. The saw blade travels through guides mounted on tubular posts. Posts telescope to adjust to work thickness. Movement of the top post is transmitted to the bottom post and to the feed wheel. A handwheel on the top post permits 180 deg of twist in either direction. The lower feed wheel turns with the blade. The power feed wheel causes the entire yoke to move in the direction of the saw blade. Feed force is rheostat controlled, and the cutting head may be swung free when desired. Hydraulic motors in the yoke drive the two bottom band wheels, work light, etc. *DoALL Company, Dept. RLC, 254 No. Laurel ave., Des Plaines, Ill.*



100-Ton Jack

This 100-ton two-speed hydraulic jack, Model 100B-12, is a high-capacity type for handling extra heavy loads such as found in locomotive erecting shops, ma-

(Continued on page 94)

How Metallizing saves money in railroad shops

"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scatches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

Some of the 28 major railroads using Metallizing:

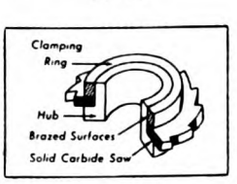
A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

Metallizing Engineering Co., Inc.
1117 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain: Telephone: EDGEWOOD 4-1300
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

Now! CLEANER, FASTER COMMUTATOR UNDERCUTTING with the GAY-LEE SOLID CARBIDE SAW

These undercutting saws, universally used by diesel engine manufacturers and many railroads, are the logical choice for your own maintenance shops. Gay-Lee's patented "One-Unit Design" combines the higher speeds and longer life of a carbide blade with a strong, rigid steel hub for perfect alignment. The solid carbide blade and steel hub are brazed into a one-piece unbreakable unit that will not part during use or re-grinding. Available in "U" or "V" type.

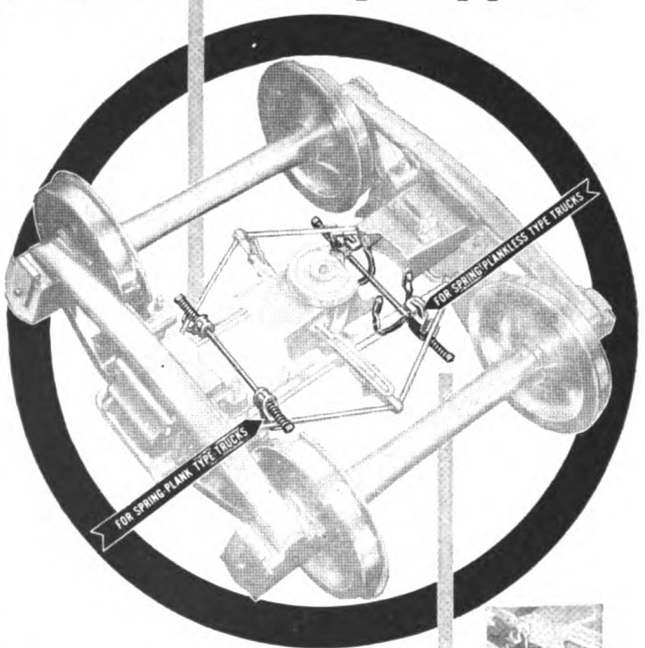


MANUFACTURED UNDER LICENSE PATENT NO. 2,422,404

Send diameter, arbor size and thickness desired for quotation.

GAY-LEE COMPANY
CLAWSON • MICHIGAN

in your rebuilding program the GRIPCO Brake Beam Safety Support



gives added safety at minimum cost

SPRING-PLANK TYPE

Can be designed for ANY Brake Beam

The Gripco Brake Beam Safety Support provides the greatest safety at lowest cost. Its dependability has been proven over years of actual service. Gripco Safety Supports are low in original cost, low in application cost and low in maintenance cost, even after years of service.

SPRING-PLANKLESS TYPE
(Safety Loops Included)

1. Supports the brake beam in event of brake beam or hanger failure.
2. Holds brake beam in horizontal position.
3. Holds brake shoes in proper position in relation to the periphery of the wheel.
4. The brake release feature pulls brake shoes away from wheel contact instantly when brakes are released.
5. Prevents unnecessary wheel and shoe wear caused by dragging brake shoes.
6. Gripco Supports can be removed and replaced without removing nuts.
7. Gripco Supports also function as a foundation brake gear control.
8. Brake Beams, rods and levers are held in position under spring tension thus reducing false movements, chattering and wear of parts to a minimum.

A.A.R. APPROVED—PATENTED AND PATENTS PENDING

OTHER GRIP NUT PRODUCTS AD NO. 110

Grip Lock Nut #1 Grip Holding Nut #2 Railroad Gripco Lock Nut #3

GRIP NUT COMPANY
Serving American Railroads Since 1904
106 BROAD ST., • SOUTH WHITLEY, IND.

EQUIPMENT

(*Continued from page 92*)

chinery moving and bridge building. It has a lifting height of 6⅛ in.

To permit rapid engagement of the load, the jack is equipped with a tandem pump. By actuating both high-speed and high-lift plungers, the operator brings the ram in contact with the load. Using the high-lift plunger alone, the load is then lifted. Dual release valves in the base can be operated from either side. The jack base is drilled and tapped for an optional pressure gauge. *Western Railroad Supply Company, Dept. RLC, 2400-2434 South Ashland ave., Chicago 8.*

Teflon Tapes

A complete line of cementable, glass-supported (glass cloth reinforced) and unsupported Teflon tapes has been announced. Teflon, which has an extremely low coefficient of friction can now be cemented to virtually any type of surface. It is corrosion-resistant, and features excellent electrical properties.

Now available in glass reinforced form, CDF cementable, glass-supported Teflon permits applications previously considered impractical or impossible with unsupported tape. The glass-supported material differs from the unsupported tape in that it is reinforced with finely-woven strong glass cloth, giving it increased abrasive resistance, higher tensile strength, lower cold flow, improved dimensional stability, and generally superior mechanical properties.

Both CDF cementable glass-supported and unsupported Teflon can be bonded with ordinary adhesives to practically any surface including metal, plastics, glass, wood, ceramics, and rubber. Produced in widths from 1/4 in. to 12 in. and in thicknesses from .002 in. to .060 in., the tapes are available with either one or both surfaces treated for adhesion. The cementable surface is produced by treatment with a sodium ammonia mixture.

The materials are used for motor and generator insulation and also for mechanical purposes such as non-sticking chute and hopper linings, facings for conveyor belts and guide rails, non-corrosive linings for chemical vats and containers, etc. *Continental-Diamond Fibre Corporation, Dept. RLC, Newark, Del.*

ARC · SPOT miller GENERATORS WELDERS

. . . WORLD'S LONGEST LINE OF WELDERS

Here's the List--

A-C Transformer Type
in 16 models from 20 to 800 amperes

A-C Submerged Arc Type
3 models, 150 to 1875 amperes

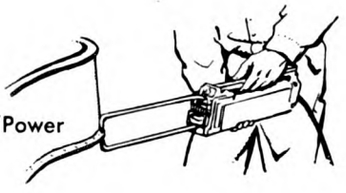
D-C Selenium Rectifier Type
12 models, 3 to 1500 amperes

D-C Selenium Rectifier Constant Potential Type
3 models, 300 to 1000 amperes

A-C/D-C Combinations for Metallic Arc Welding
6 models, 10 to 525 amperes

Spotwelders
14 models, 1.5 to 20 KVA

A-C and D-C Engine Driven Welders/Power Plants
6 models, 15 to 350 amperes



A-C/D-C Combinations for Inert Gas/Metallic Arc Welding
8 models, 10 to 550 amperes

A-C Inert Gas Welders
23 models, 5 to 700 amperes

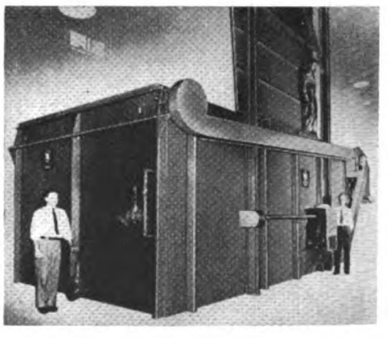
High Frequency Units
9 models, up to 1000 ampere capacity

High Frequency Units with Water/Gas Controls
8 models, up to 1000 ampere capacity

PLUS: control panels, remote control units, water coolant systems, electrodes, electrode holders, running gear and welding accessories.

What's more, "... if it's Miller you know it's the finest..."

miller ELECTRIC MANUFACTURING CO., INC.
APPLETON • WISCONSIN
Distributed in Canada by Canadian Liquid Air Co., Ltd. Montreal, P.Q.



Heavy-duty Cleaning Machine

This addition to the heavy-duty series of cleaning machines, specifically designed to clean six-wheel diesel locomotive truck assemblies, crankcases and engine parts, performs on the Aja-Dip principle which is an electro-mechanical drive. Its great size and capacity are believed minimized by its push-button operation. One button lifts and lowers the cover and the other button station activates the agitation motor.

The unit is 35 ft long, overall, 15 ft wide, and 20 ft high. The load capacity is 14,000 lb and the liquid capacity is 18,000 gal of cleaning solution. A fluid-coupled 40-hp motor powers the raising and the lowering of the carrier within the tank. The fluid coupling is an aid to easing shock loads. Fifty-two up-and-down motions per minute function within an 8-in. stroke. This movement does the cleaning, leaving the parts in a rinsable condition ready for reassembly or reconditioning.

The manufacturer of this machine reports savings up to 95 per cent in labor, 60 per cent in cleaning solution, and 90 per cent in man-hours. The loading and the unloading of the pieces is said to be the only labor required. *Magnus Chemical Company, Equipment Div., Dept. RLC, Garwood, N. J.*

(*Turn to page 98*)

a three way combination to greater savings . . .

3

DOUBLE SEAL RINGS

Cast from GUN IRON for longest wear and designed with wide face to eliminate piston slap. Other features include double seal action and a flexibly bonded sealing tongue that eliminates breakage.

AIR COMPRESSOR CYLINDER

Cast from GUN IRON for longest wear and designed with 42% greater cooling area for lower operating temperatures. Lower operating temperatures reduce condensation and carboning of valves.

AIR COMPRESSOR PISTON

Cast from GUN IRON for longest wear and designed to receive wide faced Hunt-Spiller Double Seal Rings for improved oil control and smoother operation.

HUNT-SPILLER
REPLACEMENT PARTS

The air compressor parts shown here are all cast from Hunt-Spiller GUN IRON . . . a dense cast iron that is melted under rigid metallurgical control. Its properties, found in no other metal, provide long life and highest resistance to wear. In addition, these replacement parts incorporate many unique design details. Specify *all three Hunt-Spiller replacement parts*, and attain all of these money saving advantages:

- **Highest resistance to wear**
- **Reduced operating temperatures**
- **Minimum carryover of oil and moisture**
- **Less carboning of valves**

Write for Bulletin H-4 *"Gun Iron, Your Key to Lower Cost"*

New oil sets record in 330,000-mile

GULF DIESELMOTIVE

protects rated power of high-output

The pictures tell the story. Gulf's new Dieselmotive 78 keeps engines cleaner — longer. But that's not all. *This new oil enables high-output Diesels to deliver their full rated power . . . under certain conditions, it can actually increase the tonnage ratings!*

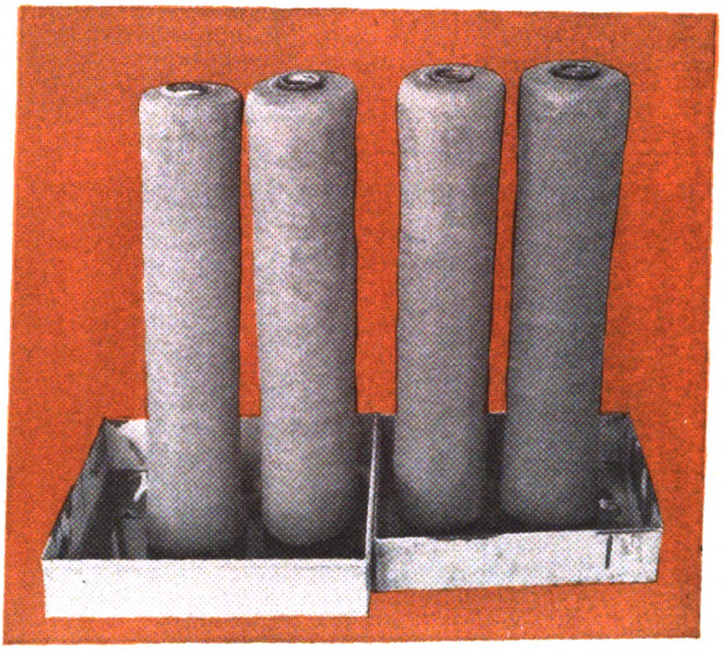
Southern Pacific put Dieselmotive 78 through a series of grueling tests in EMD 567-C units on Southern Pacific lines in Texas and Louisiana. You know the run—from hot and humid lowlands to chilly mountain passes . . . temperatures ranging from 110 to zero degrees. Tough hauls up steep grades . . . long runs through dust, heat and cold.

After 165,825 miles, the engines were disassembled. Rings, pistons and liners showed amazingly little wear. There were no heavy deposits or varnish anywhere. Main bearing shells were so near-new they were re-installed for further service.

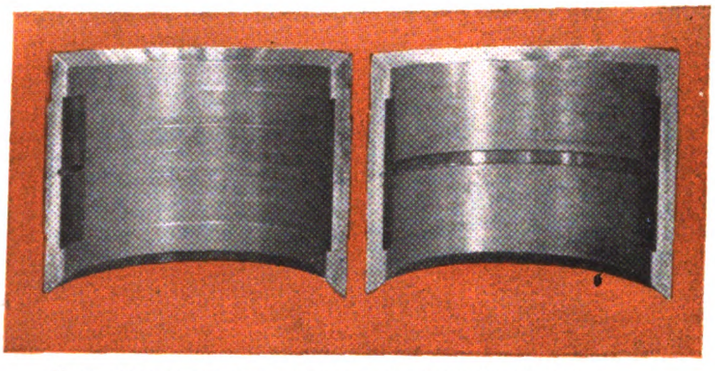
You can see how engines as clean as this deliver all the power built into them. Com-

,000 test . . .

After 165,825 test miles on Dieselmotive 78, pistons and liners when removed looked like this. All parts were clean, free of deposits and showed negligible wear.



Filters are free of heavy sludge. Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils. This additive reserve insures cleaner engines, less wear, than ever before.



Note clean appearance of connecting rod bearings immediately after removal from engines. Gulf Dieselmotive 78 retains its stability and lubricity even when subjected to high temperatures for extended periods.

78 OIL
engines

pression is maintained, insuring continued high engine efficiency.

Gulf Dieselmotive 78 is now being demonstrated on the Missouri Pacific and Seaboard Airline Railroads. Why don't you try this new and better oil? Merely contact the Gulf engineer at your nearest Gulf office for any help you need. Or, write for more data.

GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

GULF

EQUIPMENT

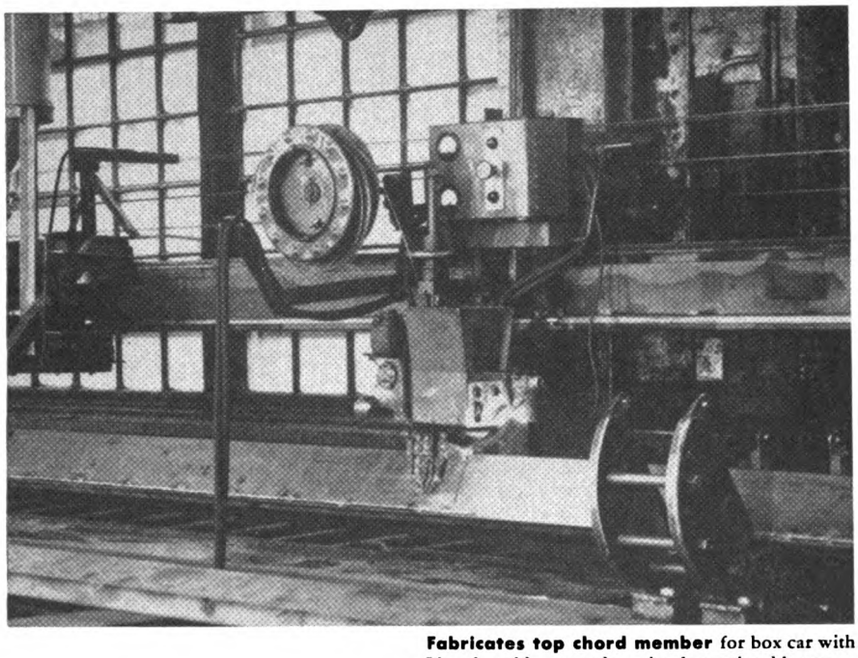
(*Continued from page 94*)

Degreasing Solvents

These nonflammable Freon solvents for vapor degreasing or cleaning by liquid immersion, oil, grease, and dirt without harming delicate metal parts or electrical insulation, yet are safe enough to use in ordinary work areas with conventional ventilating equipment, according to the manufacturer. They are said to be nonflammable and nonexplosive, for use in open shop areas, and their inhalation toxicity low.

When cleaning electrical motors, both new and reconditioned, the problem has been the tendency of cleaning solvents to attack the insulation on wiring, weakening it enough to cause short-circuits. Three years of tests indicate that these degreasing solvents will not soften or check any of the commonly used insulation.

Three types are available in 10- to 55-gal containers. Freon MF, has a boiling point of 75 deg F; Freon BF boils at 199 deg F, and Freon TF boils at 118 deg F. Portable cleaning tanks, unsuitable for use with more toxic or flammable solvents, are now being developed to make these solvents easy to use in small-scale cleaning operations. *E. I. du Pont de Nemours & Co., Dept. RLC, 7506 Nemours Bldg., Wilmington, Del.*



Fabricates top chord member for box car with Lincolnweld mounted on simple overhead beam.

Speed production with LINCOLNWELD

Easy to mount, simple to use, dependable in operation gives you:

LAF-3 for DC welding

LAF-4 for AC welding

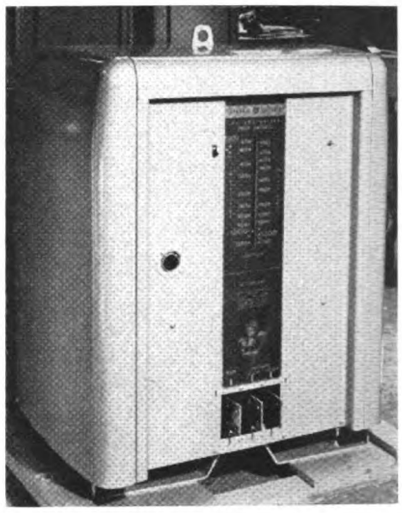
- **best starting . . . uniform welds**
- **cold starts or hot starts**
- **variable voltage, constant potential power**
- **slow-to-fast inching speeds**
- **simple accurate positioning**

Send for Bulletin SB-1355. Write Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio. Railroad representative of

THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

LINCOLN . . . one dependable source for all your arc welding needs



1000 Amperes for Submerged Arcs

A 1000-amp a-c transformer welder designed primarily as a power source for the submerged arc process has been announced by GE's Welding Department.

With an operating range of 325 to 1000 amp, the new single-phase welder has motor-driven current control. The controls regularly mounted on the welder case may be operated remotely by means of plug and receptacle control.

Open circuit voltages are 85 to 100 volts and the welders will operate on either 230 or 460 volts. Power factor correction is provided by capacitors. Built into the welder is a 2-kva control transformer, which can be used externally for operating of auxiliary equipment. All coils are protected by Class H insulation, rated for 130 deg C temperature rise. *General Electric Company, Welding Dept., Dept. RLC, Schenectady, N. Y.*

Spray Gun Receiver

A paint-spray gun receiver which keeps the nozzle tip in a solvent solution when not in use prevents paint from hardening

and may be located on the spray booth wall or bench. Gun rests in the receiver with hoses attached for convenience. An out-of-the way reservoir tank maintains the liquid level in the receiver. For safety, there is a perforated metal fire baffle in the gun port opening to prevent ignition of the solvent.

Multiple gun receivers are available as well as the single units described. Similar receivers are available to keep the paint hose quick-connector ends in solvent when not in use. *Protectoseal Company, Dept. RLC, 1920 South Western ave., Chicago 8.*

Upgrading Equipment And Materials

Box Car Upgrader

Continental upgrader S-367, according to the manufacturer, will upgrade the floor of a 40-ft box car in average condition in 30 to 40 min, at an average cost of $15.

The material, a composition of wood flour and resins, reportedly stain resistant, is applied in semi-liquid form with a floor broom. It is said to dry to a wood-like hardness in a few hours, binds floor splinters together, seals small cracks, smooths rough floors, repels infestation, hides and thoroughly seals grease spots, oil stains, etc.

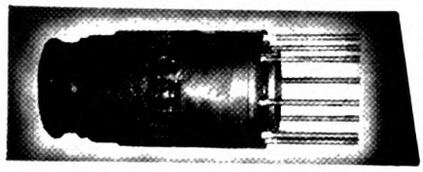
The manufacturer claims once a floor has been upgraded with this material, areas worn through later may be "spot patched," making it unnecessary to upgrade the entire floor again. *Armstrong Paint & Varnish Works, Dept. RLC, 1330 South Kilbourn ave., Chicago 23.*

Plastic Upgrader

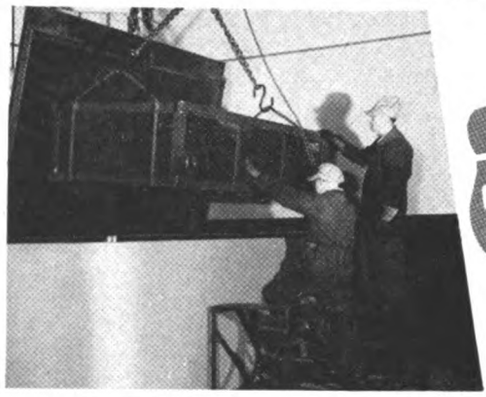
Armortex is a tough mastic with a plastic base material which bonds to box-car floors and walls after initial application. The spray-brush grade was described on page 6 of the February 1956 issue. It would seal cracks up to 1/16 in.

A caulking grade, which can be used to seal in larger cracks up to ½ in. and

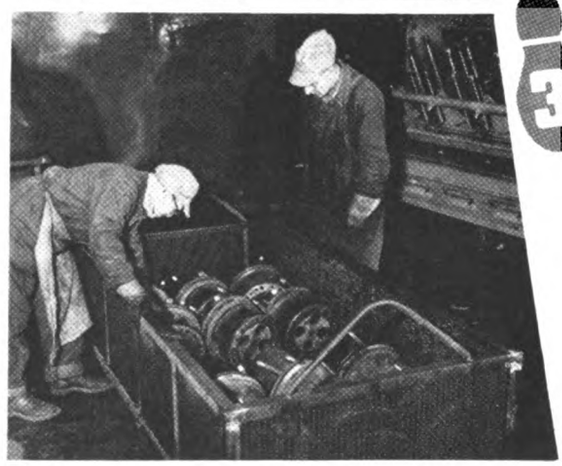
3 EASY STEPS TO SAVE YOU MONEY!



1 Start with dirty, carbon encrusted diesel engine liner (or any other diesel parts to be cleaned).



2 Place the liner (or any other diesel parts to be cleaned) in cleaning basket and submerge into Lix Diesel Klean Heavy.



3 In less than half the usual time inspect the diesel liner, (or other diesel parts) . . . and when thoroughly cleaned, just rinse with water or mineral spirits.

You get THIS . . .

AT LESS COST, BECAUSE "LIX DIESEL KLEAN HEAVY" SOAKS AWAY CAKED CARBON.

No brushing or scraping is necessary. Time and hard labor is reduced to a minimum. Lix is harmless to all types of metals during their cleaning cycle.

Pistons, Bearings, Injection Nozzles, in fact all working parts of diesel locomotives can be cleaned faster, better and safer with Lix Diesel Klean Heavy.

Write, wire or phone for a representative to demonstrate in your shop. No obligation!

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

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(OF MISSOURI)

PRODUCTS OF RESEARCH

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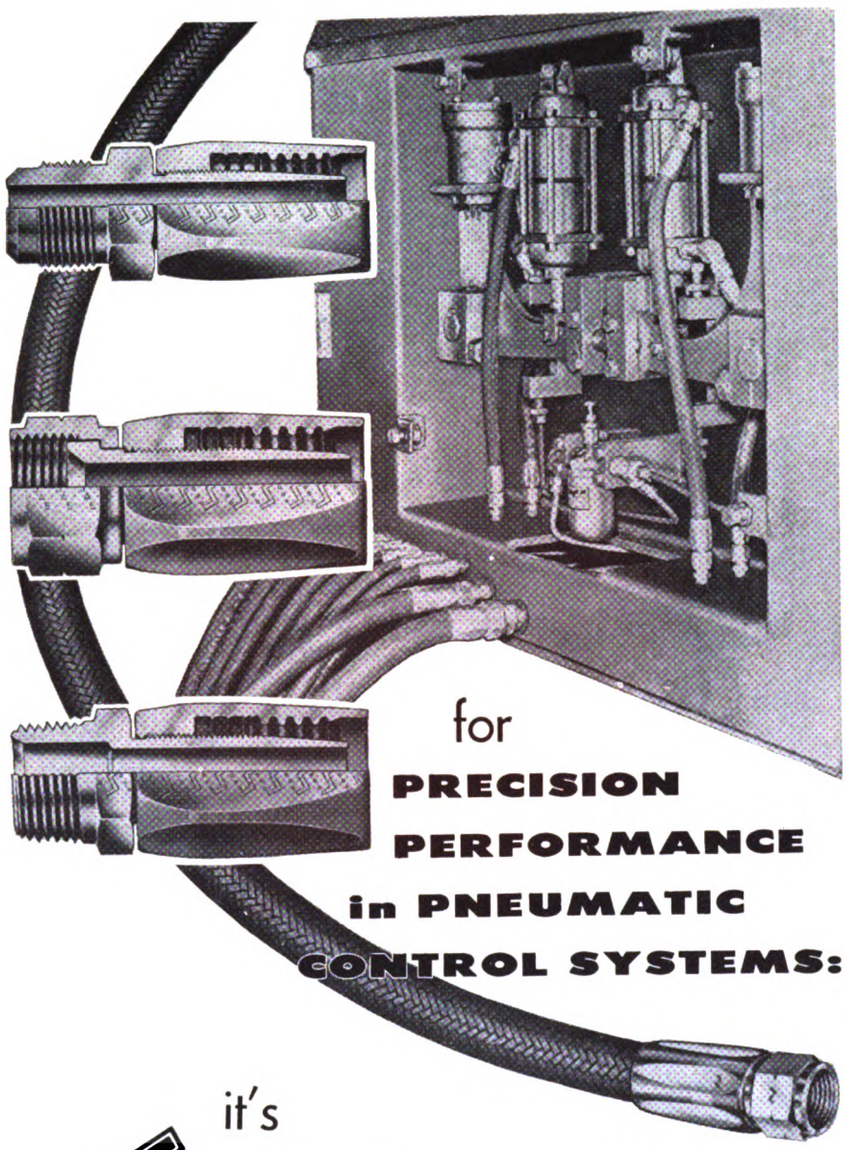
KANSAS CITY, MISSOURI

Leadership in Industrial Cleaning"



it's

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FITTINGS and HOSE

For pneumatic control systems and air brake applications that require superior hose and fittings, specify Stratoflex. Stratoflex hose provides the flexibility, small bend radii, and durability that is essential for long and dependable service. Stratoflex fittings assure leak-proof connections under extreme pressure variations. They are quick on-and-off and are detachable and reusable. WRITE FOR BULLETIN S-2H

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gouged out areas in the linings, floors and door posts, is now available. It is of the same basic material as regular Armortex, but of a much heavier consistency. It can be troweled into the larger cracks, or applied with a caulking gun where a continuous bead is desired to seal the deck ends or any long crack.

The caulking grade Armortex comes ready for use and does not require any mixing. It is odorless, non-staining and non-toxic. Roads using the caulking grade, it is said, can seal a car in average condition for grain loading with approximately one to two gallons per car, and on the following day the car may be loaded. *J. W. Mortell Company, Dept. RLC, Kankakee, Ill.*

Other Upgrading Materials Described During the Past Year

In Railway Locomotives and Cars

Corrosion Resistant Neoprene Coatings.—GACO N-700, a liquid neoprene coating, which, according to the manufacturer, makes a firm bond with steel and will not crack, chip or soften. (See page 108, March 1956.) *Gates Engineering Company, 100 S. West st., Wilmington 99, Del.*

Center Door Posts. — The Claim Saver center door post fits any size box car and requires no structural changes to the car. It carries 75 per cent of the weight in doorway openings to protect regular wooden door posts from splitting and twisting. (See page 88 January 1956.) *Railroad Engineering Corporation, Aurora, Ill.*

Glid-Iron.—This is a 100 per cent solids resin coating which can be applied to wood or primed metal by spray, brush, roller or squeegee in any mil thickness. (See page 99, March 1956.) *Glidden Company, Cleveland.*

Lining Laminate. — Conoglas is a glass fabric reinforced polyester laminate for lining bins, tanks, freight cars, etc. It is white and flexible, stain-resistant and waterproof. (See page 85, February 1957.) *Continental Can Company, Conolite Div., 205 West 14th st., Wilmington 99, Del.*

Box-Car Liner.— Conolite is a laminate of polyester resin and glass cloth developed to protect box-car walls from wear and impact. (See page 6, March 1957.) *Continental Can Company, Conolite Div., 205 West 14th st., Wilmington 99, Del.*

In Railway Age

Freight-Liner.— The Freight-Liner system is a "package" consisting of a fiberglas cloth and a plastic material for patching bad spots in car lining or floors, or for complete relining of a car. The plastic and fiberglas for doing the whole relining job, however, are different from those used in patching work, but both are

(*Continued on page 102*)

America's foremost engineered lettering tools

designed to reduce your present costs 50 to 80%

Used today by 1/3rd of the Nation's leading Railroads . .

DN

Spray it— STENCILS

PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

THE DEMP·NOCK COMPANY

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DEMP NOCK

NOLAN RERAILERS

WILL RERAIL ANY TYPE OR SIZE OF LOCOMOTIVE OR CAR IN RECORD TIME!

Thousands in use by railroad operators all over the world. Recommended by Safety Inspectors and Engineers. Built of special alloy heat-treated steel for rugged service. Nolan Rerailers are used in pairs, and will retrack wheels from either or both sides of rail at same time. Each Rerailer straddles the rail, with the narrow end on top of the rail. The derailed wheel comes up the gradual slope, and is forced back on to the rail by the guiding grooves and ridges. Can be used anywhere on the track.

Size of Rerailer	*For Use on Rails as Follows*	*Locomotive or Car Capacity*
No. 2	16 lbs. to 40 lbs.	10 tons
No. 3	30 lbs. to 60 lbs.	15 tons
No. 3½	40 lbs. to 70 lbs.	20 tons
No. 4	50 lbs. to 75 lbs.	40 tons
No. 5	70 lbs. to 100 lbs.	100 tons
No. 5½	85 lbs. to 133 lbs.	200 tons
No. 5¾	85 lbs. to 155 lbs	300 tons

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Send Order Now! Immediate Delivery. Complete Satisfaction Guaranteed. Free Descriptive Literature.

THE NOLAN COMPANY

171 PENNSYLVANIA STREET
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Rough country on pins and bushings...best reason for specifying Ex-Cell-O

Colorado country is beautiful—but rough on pins and bushings. As passenger cars stretch and strain over torturous mountain passes abrasive sand and grit want to eat away at the finish of pins and bushings. No wonder Ex-Cell-O is first choice by over 200 railroads!

A diamond-hard steel case and a super-fine finish resist wear and abrasion. Electronically controlled heat treating and precision grinding assure you of longer wear under the most severe conditions.

You *know* the Ex-Cell-O reputation . . . do you know your Ex-Cell-O representative? Why not contact him or Ex-Cell-O, Detroit.

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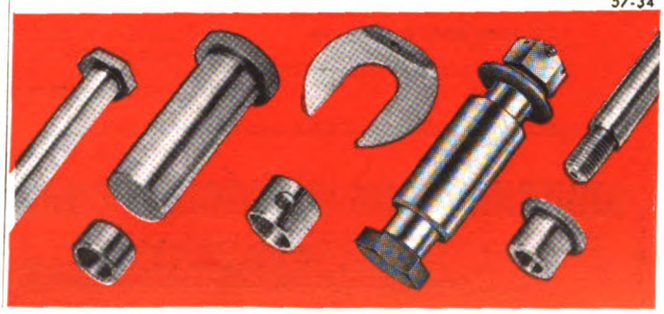
RAILROAD DIVISION, EX-CELL-O CORPORATION, DETROIT 32, MICHIGAN

57-34



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—THE *LOWER COST* LUBRICATOR
THAT FULFILLS ALL REQUIREMENTS

AAR APPROVED FOR 10,000 CARS
IN GENERAL INTERCHANGE SERVICE

Heavy loop pile surfaces designed for easy application and removal . . . special unsized duck casing. REINFORCED SIDING TO STAND EXTRAORDINARY WEAR AND TEAR.

100% wool-batt core . . . quilted construction to assure stability . . . available in two sizes: 9-10 for 9″ and 10″ AAR standard journal boxes and 11-12 for 11″ and 12″ standard boxes.

A POSITIVE ADVANCE
IN JOURNAL LUBRICATION

- CANNOT POSSIBLY GLAZE!
- IS UNAFFECTED BY TEMPERATURE CHANGES.
- Contains an UNUSUALLY LARGE OIL RESERVOIR.
- IS RECLAIMABLE!
- HAS EXCEPTIONAL WICKING and FILTERING qualities.

JOURNAL BOX SERVICING CORPORATION

'30 [illegible] Ill.
General Office: [illegible] Indianapolis 20, Ind.

EQUIPMENT

(*Continued from page 100*)

applied in the same manner. Cars are ready for use in 3-6 hr after upgrading work is done. One layer of the material is said to provide strength to withstand normal pressures. If desired, the material can be laminated, layer on layer. The Freight-Liner material is said to remain firm at temperatures up to 240 deg F and does not get brittle at temperatures down to —30 deg F. It can be cleaned with detergents, disinfectants or steam. (See page 48, May 28, 1956.) *Archer-Daniels-Midland Company, 700 Investors Bldg., Minneapolis 2.*

Car Insecticide. — This insecticide contains pyrethrins and piperonyl butoxide. It is sprayed from an electric powered "Mistorizer" or Westone sprayer, and at least 1 gal per car is sprayed to prevent infestation of grain and flour in transit. The insecticide is said to have no objectionable odors and will not corrode metals. (See page 42, May 28, 1956.) *West Disinfecting Company, 42-16 West st., Long Island City 1, N. Y.*

Hard Surface Upgrading Material.—A hard surfacing material for freight-car lining, the Espey Carliner, can be applied to any type of wood as well as to steel, although a primer may be needed for steel. Brushes are used to apply the resin to the car walls or floors. Espey can be used as a patching material for covering holes in car walls and floors. Its resistance to abrasion is intended to increase the life of car floors and walls. (See page 42, May 28, 1956.) *Spring Packing Corporation, 332 S. Michigan ave., Chicago 4.*

Stapling Hammer. — The Bostitch H2BR stapling hammer is intended for paper lining freight cars. The staple is made of galvanized wire, .103 in. wide, while staple legs are ⅜ in. long. The width of the staples is said to provide extra surface contact which keeps paper from tearing away from the walls of the car. The magazine holds 70 staples. (See page 43, May 28, 1956.) *Bostitch, 14 Briggs Drive, East Greenwich, R. I.*

Permanent Plastic Car Liner.— Leader-Kote 700 may be brushed or sprayed on walls or floors of freight cars to form a plastic liner. It is not affected by solvents and most acids and is nontoxic. This makes it acceptable for cars which carry grain, sugar or flour. (See page 43, May 28, 1956.) *Coatings Division, Leader Iron Works, Inc., 410 N. Michigan ave., Chicago.*

Corrugated Board Grain Door. —The Ford door has steel strap extensions so that faulty door posts may be by-passed and the door nailed to the first studs on each side. It is furnished in complete sets which can be handled by one man. (See page 52, May 28, 1956.) *Ford Grain Door Company, 110 N. 40th st., Omaha 3, Neb.*

Gasoline Powered Scraper. — The Model CR gasoline-powered scraper, it is said, can clean and smooth stock car floors in 50 per cent of the usual time. It is a 6-hp machine and is supplied with a cutter-equipped cleaning cylinder and a wire brush cylinder for smoothing and clean-up jobs. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

Portable Chipping Tool.—A portable chipping tool, designed for removing tough deposits from surfaces in hard-to-reach areas in cars, bins, etc., is powered by a ¾-hp (12,000 rpm) electric or air motor. The tool reportedly works from 12-20 times faster than a man with a hand scraper. Chipping action is provided by twin cutter-equipped cylindrical heads rotating at high speed. The machine is used for removing rust from steel, cleaning paint from surfaces, etc. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

Electric Power Sweeper—One man sweeps an entire box car in 3½ min with this model "36" sweeper with which it is estimated an experienced operator could sweep a typical car in approximately 2½ min. Manual sweeping time per car averages 9.3 min for two men with pushbrooms (18 or 19 man-minutes), according to car shop personnel of one railroad. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

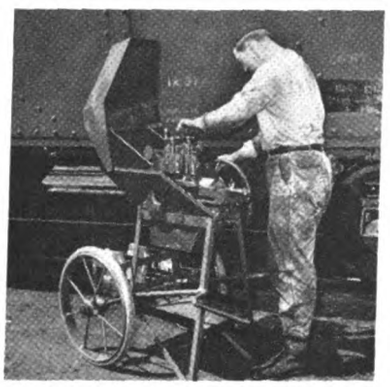
Cartite Upgrading Papers. — Most of the nine types of Cartite carlining papers consist of two sheets of 30-lb Kraft paper combined in a double coating processed by asphalt compounds. However, single sheets creped and waxed are available for use in cars where asphaltically bonded papers would be objectionable. The asphalt laminated papers are water repellent. Most of the asphaltic papers are reinforced with spun fibers to give increased tensile strength and tear resistance. Several of the papers are 18 per cent creped for increased puncture resistance, cushioning, flexibility and ease of application. Cartite papers are available in all standard size rolls, and special sizes. (See page 52, May 28, 1956.) *Brandon Equipment Company, 332 S. Michigan ave., Chicago 4.*

Dunnage Door.—The Hummel dunnage door weighs only 35 lb. It is a paper door with a strong reinforcing wood frame. The frame is 7 ft wide, while the paper is 9 ft. wide. The frame fits snugly into the car door and prevents leakage around the side of the door and at the bottom. The company also makes a "one-man" car liner. These liners are made in standard sizes to fit general types of cars. Coverings for walls and floors are one piece for each purpose. The liners can be made of any weight Kraft paper. (See page 42, May 28, 1956.) *Hummel Manufacturing Company, Hopewell, Va.*

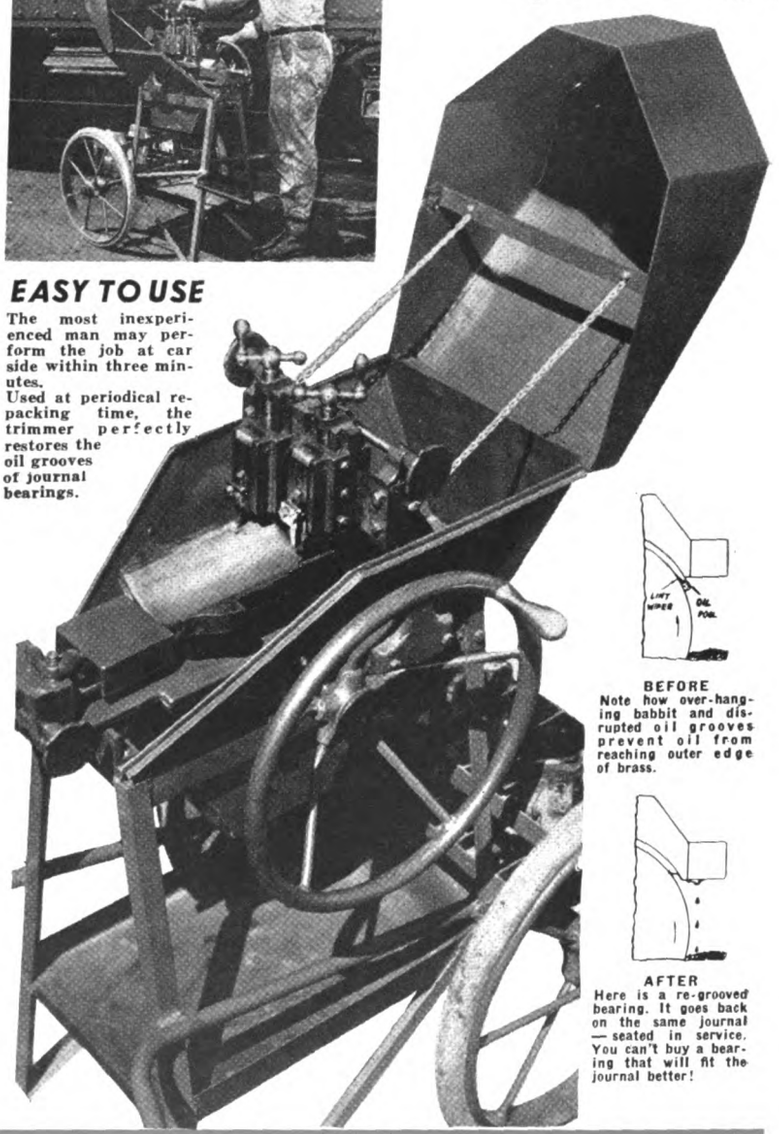
RENT or BUY . . .

THE FAMOUS **JBS** BRASS TRIMMER

SAVES $5.00 ANNUALLY PER CAR!*



*Many years of service records *verify* even greater savings!



EASY TO USE

The most inexperienced man may perform the job at car side within three minutes.
Used at periodical repacking time, the trimmer perfectly restores the oil grooves of journal bearings.

BEFORE
Note how over-hanging babbit and disrupted oil grooves prevent oil from reaching outer edge of brass.

AFTER
Here is a re-grooved bearing. It goes back on the same journal — seated in service. You can't buy a bearing that will fit the journal better!

BEARINGS BETTER THAN NEW!

ELIMINATES CRUCIAL BREAK-IN PERIOD

Trimming and reapplication to the journal from which removed results in the perfectly FITTED BEARING and eliminates the hazard of failure during the otherwise crucial break-in period of a new bearing.

AAR APPROVED

The trimming of bearings has been approved as a CHARGEABLE ITEM on cars in interchange.

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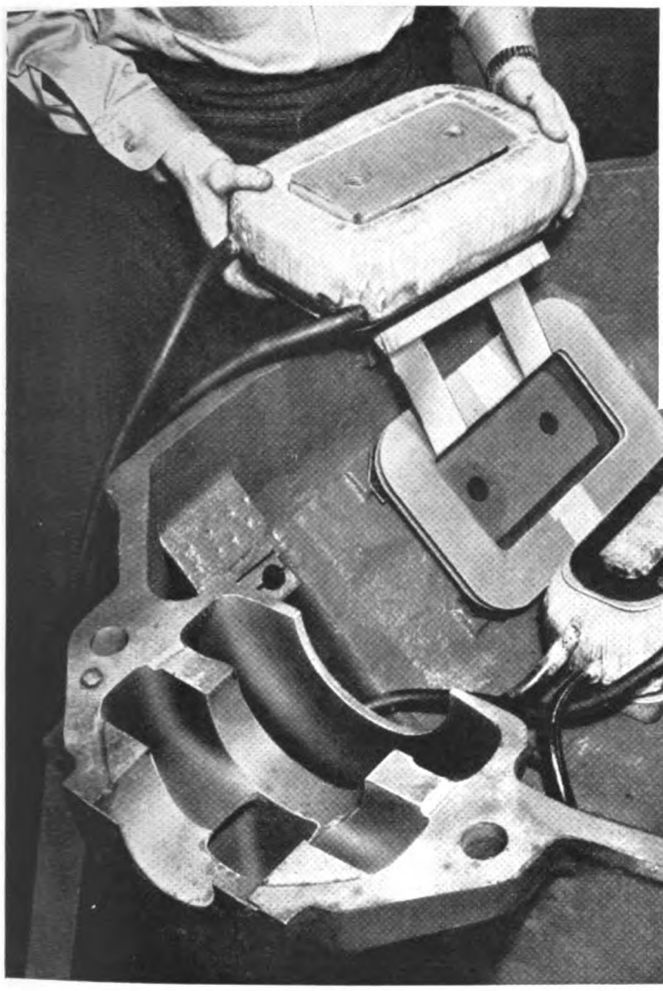

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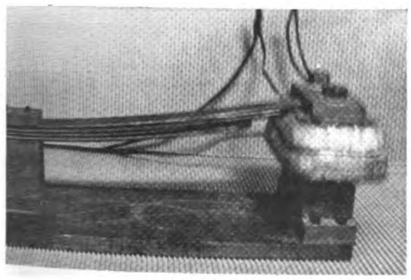


INCREASED STRENGTH

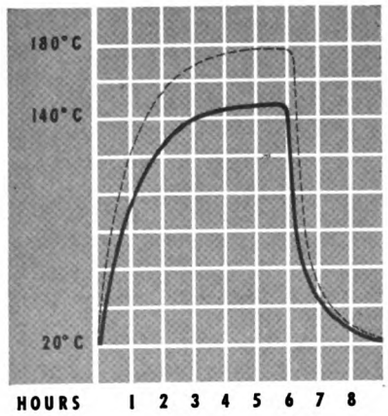
Complete polyester filling bonds all parts of the coil into a strong, unified, shock-resistant construction. The photograph at the left shows a shock test in which an energized and heated coil has been striking an anvil once a second for six months with no adverse effects.

GREATER RESISTANCE TO CORROSIVE ENVIRONMENTS

Complete polyester filling prevents penetration of moisture, oil, conducting dust, and other foreign matter that contribute to coil failures. The photograph at left shows a test in which National polyester coils were immersed successively in water, hot oil, and an iron filing solution. Periodic resistance tests show *no deterioration* of the insulation after several months submersion.

COOLER OPERATION

Absence of voids in the coil enhances heat transfer. The graph below shows comparative heating and cooling cycles for polyester-filled (solid line) and conventional varnish-treated (dotted line) field coils carrying the same amperage.



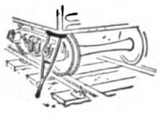
National polyester-filled field coils can be installed in National service shops or supplied for installation by your own motor maintenance crews. Call your nearby National field engineer or write for details.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

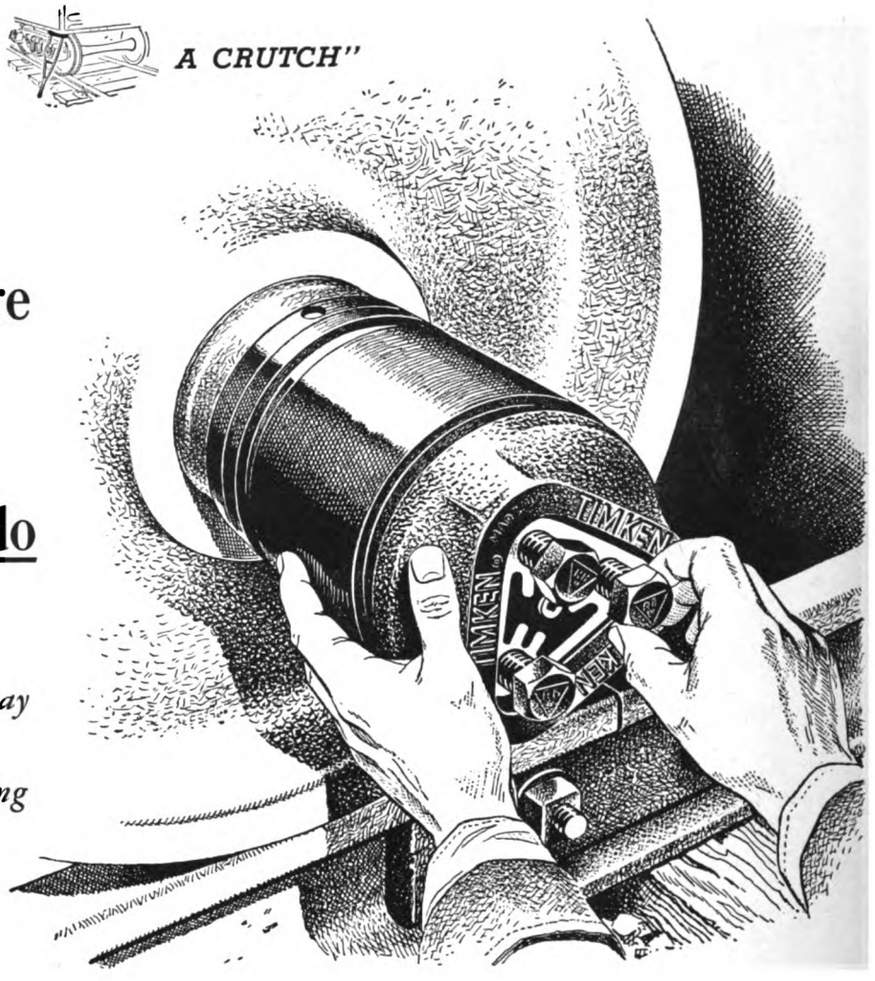
TRADE MARK

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

"A CURE IS BETTER THAN  *A CRUTCH"*

Crutches don't cure the Hot Box problem . . . but Timken® bearings do

. . . and TIMKEN bearings pay for themselves over and over and over in operating and maintenance savings



GIVING friction bearings "crutches"—devices attempting to improve performance—never cures the hot box problem. But Timken® bearings *cure* it, because they eliminate the *cause* of hot boxes—the friction bearing itself.

HOW SAVINGS MOUNT

Timken bearings eliminate the frequent inspection and lubrication that are necessary to keep friction bearings operating even with "crutches". Terminal bearing inspection is cut 90%. Lubricant costs are slashed as much as 95%. Fact is, the new Timken heavy-duty type AP (All Purpose) bearing assembly can go three years without the addition of lubricant. Costs less to use and to install too. When all railroads go "Roller Freight", they'll save an estimated $224 million a year, earn about a 22% net annual return on the investment.

THE TAPER HOLDS THE "SECRET"

The reason Timken bearings eliminate the hot box problem is—they *roll* the load. They don't slide it as friction bearings do. There's no metal-to-metal sliding friction. And the reason Timken bearings are the only journal bearings you can count on to cure the hot box problem *and* cut costs to the bone is—their tapered roller design. It prevents lateral movement. There's no scuffing or skewing, bearings last longer. There's no pumping action, so less lubricant is required.

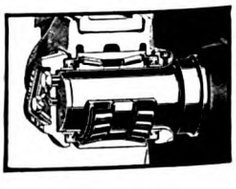
We even make our own bearing steel to assure Timken bearing quality. We take this extra step to be sure it's the finest, toughest steel available. No other American bearing maker does.

Compared to the cost of buying and maintaining "crutch" devices that never cure, the difference in price between friction bearings and roller bearings is smaller today than ever. Costs can be reduced even more, as shown by a practical conversion plan one major American railroad has adopted. Whenever a freight car of this railroad comes into its shops for major repairs, it is converted to roller bearings. This plan helps maintain a steady shop and labor schedule, reduces bearing installation cost.

CONVERTING THE PRACTICAL WAY

There's no longer any need to try and "get by" with costly "crutches". They don't cure the hot box problem. But Timken bearings *do*—and give maximum savings in operating and maintenance cost. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Only TIMKEN® bearings cure the hot box problem and cut operating and maintenance cost to a minimum



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RAILWAY LOCOMOTIVES AND CARS

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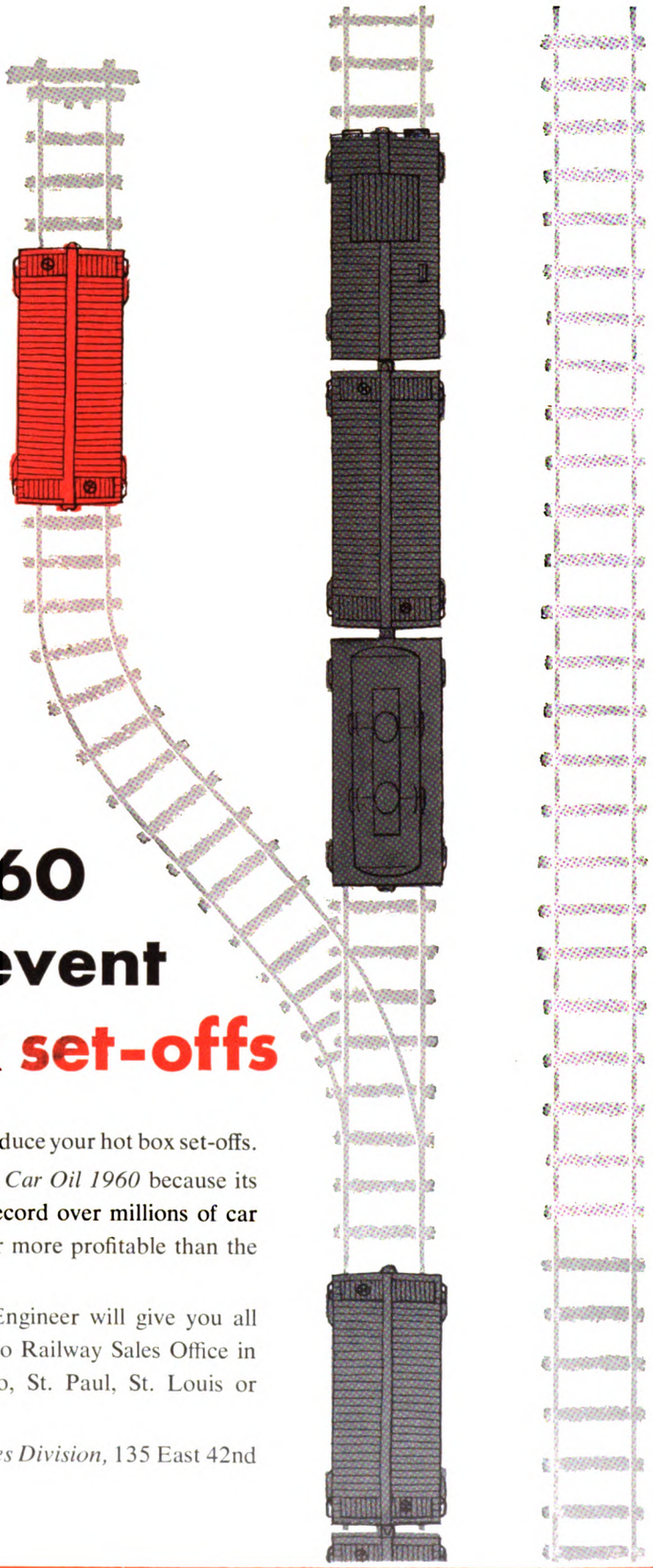
FR-16

The high efficiency of the Miner FR-16 Rubber Draft Gear results from years of aggressive research procedure correlated with facts (not theories) learned from service and manufacturing experience.

We provide ample initial compression with 25% of the work accomplished at one-half travel so there will be no slack action, thereby preventing worn coupler carriers, draft keys, or vital car parts. The final pressures are low, ensuring the ultimate in lading protection.

W. H. MINER, INC. CHICAGO



Texaco Car Oil 1960 helps prevent hot box set-offs

Switch to *Texaco Car Oil 1960* and reduce your hot box set-offs.

Leading railroads stick to *Texaco Car Oil 1960* because its premium quality and low hot box record over millions of car miles have proved the preventive far more profitable than the cure.

A Texaco Railway Lubrication Engineer will give you all the facts. Just call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

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IN ALL 48 STATES

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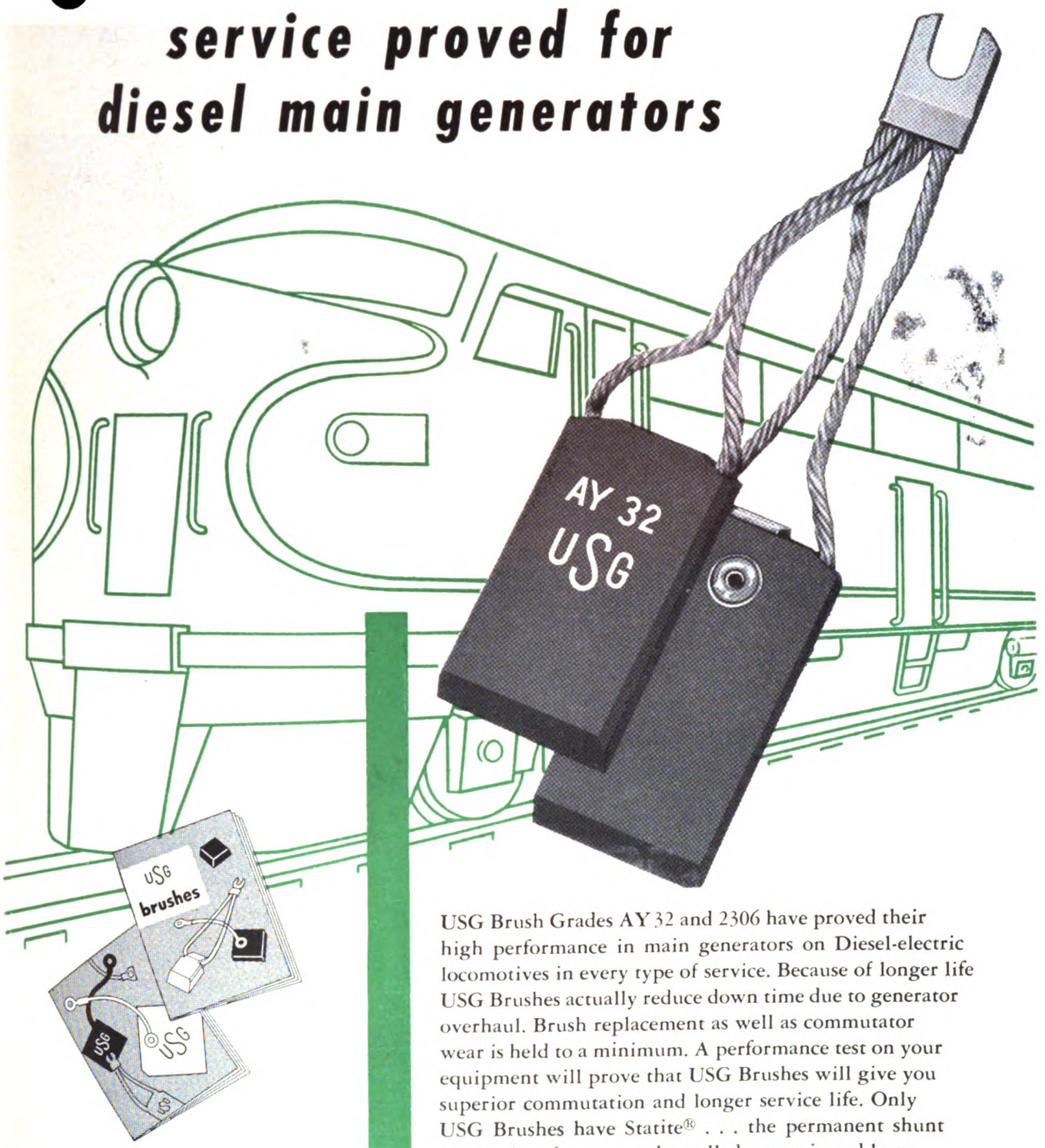
service proved for diesel main generators



Send for the latest USG Brush Catalog B-56 and the new USG Brush Grade List, both are excellent for designing or for specific applications.

USG Brush Grades AY 32 and 2306 have proved their high performance in main generators on Diesel-electric locomotives in every type of service. Because of longer life USG Brushes actually reduce down time due to generator overhaul. Brush replacement as well as commutator wear is held to a minimum. A performance test on your equipment will prove that USG Brushes will give you superior commutation and longer service life. Only USG Brushes have Statite® . . . the permanent shunt connection that cannot be pulled out or jarred loose. Statite retains its original low millivolt shunt drop. Now's the time to try USG Brush Grades AY 32 and 2306 with Statite connections that have never failed in millions of miles of railroad service! Why not order today?

223

THE UNITED STATES GRAPHITE COMPANY

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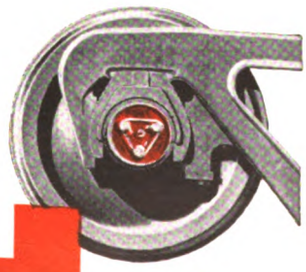
Why there's much less wait for freight today

ONE REASON IS WELDED RAIL. Many will miss the rhythmic "clickity-clack" of wheels on track. But by eliminating troublesome bolted rail joints, welding helps trains roll smoother and faster, with far fewer delays due to track maintenance work.

Watch "WIDE WIDE WORLD"
Sundays on NBC-TV



ONE MORE BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. No need to delay *this* car for bearing inspection or lubrication—he can see at a glance they're dependable HYATT Hy-Rolls! That means there's a 3-year lubricant supply sealed in. It means no more hotboxes. It means husky *straight cylindrical rollers* with extra load-carrying capacity for extra reliability. That's why 38 leading lines have already adopted the HYATT Hy-Roll as a basic part of their modernization programs —to help give America even faster freight service.
Hyatt Bearings Division of General Motors Corporation, Harrison, N.J.

Another GM GENERAL MOTORS contribution to railroad prosperity

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FOR NON-STOP FREIGHT

PUBLISHED MONTHLY BY THE

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Founded in 1832 as the American Rail-Road Journal

MAY, 1957 VOLUME 131, No. 5

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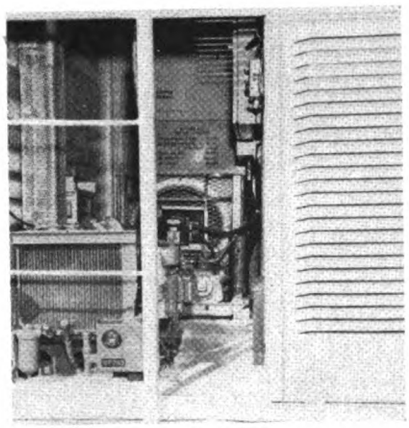
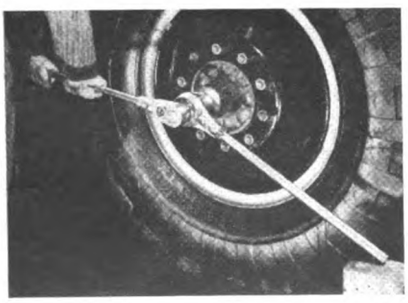
Insulating Varnishes Are Vital
B&O Production Car Rebuilding



Mechanical Refrigeration Unit

A compact refrigeration unit for mechanical refrigerator cars, according to the builder, features high capacity with low power requirements, automatic defrosting and heating as well as cooling, and weights 600 lb less than previous models. Refrigerating capacity is sufficient to provide temperatures down to minus 10 deg F under all conditions encountered within the United States. It uses a 12.5-kw Witte diesel power supply. The unit has two compressors, each capable of operating the system by itself. Both are used when high loads are imposed. All operations—alternating of compressors, heating, cooling and defrosting—are controlled by automatic devices mounted on a panel capable of withstanding severe coupling shocks. *Carrier Corporation, Dept. RA, Syracuse 1, N. Y.*



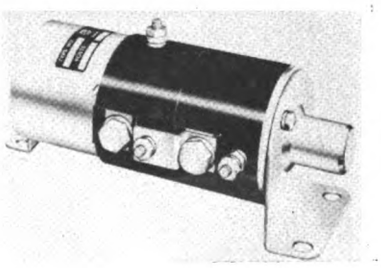
Wrench Booster

This Model TD wrench booster is a general utility tool designed to boost wrench turning force four times. Used with standard sockets and wrenches, it provides a four-to-one machanical advantage to loosen and tighten heavy threaded parts more easily and safely.

Basically, the tool is a set of planetary gears built into a simple concentric tool head. It can be completely dismantled in seconds for cleaning and lubrication and is built for torques up to 2,000 ft-lb. Models TD 750 and TD 1,000 are designed for socket-drives of ¾ in. and 1 in, respectively.

Since the torque wrench reading is multiplied by four to get the applied torque output, high-tensile steel bolts can be tightened to exact high-torque values by steady pressure, without inaccurate and dangerous impact methods. In operation, the booster joins the socket cup and the wrench, and is positioned so that the unit's reaction bar is restrained from turning in a direction opposite to the applied force. In this position the torque applied by the wrench is multiplied four times at the socket. A balanced T-wrench effect is obtained by positioning the wrench handle opposite the reaction bar. The bar applies a counteracting force that minimizes bending or breakage of the threaded part.

Muscular strain and injury from sudden breakdown at high torques is greatly reduced. The high turning power eliminates much of the damaging done by chiseling and hammering in stubborn disassembly jobs. *X-4 Corporation, Dept. RLC, Acton Mass.*

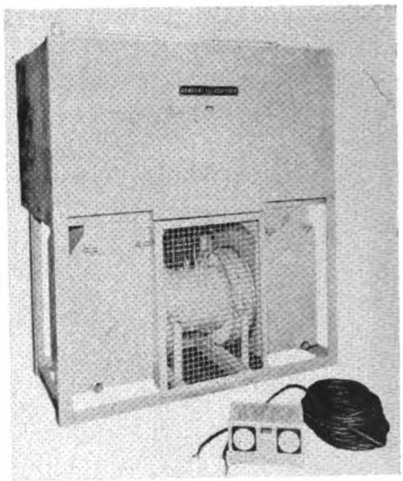


Heavy-Duty Series-Parallel Switches

These switches, 12- and 24-volt models, are applicable to industrial, marine and railroad engines with cranking motors up to 20 hp and generating systems up to 180 amps. They are of either splashproof or waterproof construction.

A single unit series-parallel switch replaces two in the usual series-parallel system with Bendix drive. According to the manufacturer, this permits less wiring on initial installations, cuts mounting costs and minimizes possibility of line losses. Less current is required to operate the coil of one switch.

A special design prevents short circuiting from contact welding, eliminating need for fuses or circuitbreakers. *Leece-Neville Company, Dept. RLC, 1374 East 51st street, Cleveland 3.*



Engine Loader Takes 3,000 Hp.

There is now available an engine loading resistor (Model 17EM89) that can test the largest diesel-electric units in railroad service today. It is capable of absorbing up to 3,000 hp and has a current capacity of 6,000 amp. Previous models have a capacity of 2,500 hp and 4,000 amp.

Greater simplicity and reliability of operation has been achieved by cutting the number of resistance steps from eight to three. A survey of railroads showed that most shops use only a few steps in testing engine output.

As a result of this simplification, all circuit changes are now made with a single four-pole double-throw switch, instead of the 20 switches formerly used. The use of one switch eliminates the possibility of burnouts caused by incorrect switch positioning.

Values of the resistance steps were selected to give satisfactory test points for all known engine-generator combinations. They are 0.045 ohms, 0.29 ohms and 0.42 ohms.

Mounted in a portable meter box, the meters may be placed anywhere within a 65-ft radius.

The protective shutters in the top of the resistor housing automatically open whenever the resistor is in use. *Locomotive and Car Equipment Dept, General Electric Company, Dept RLC, Erie, Pa.*

Waterless Hand Cleaner

The West waterless hand cleaner is a white, liquid emulsion specifically formulated to remove soil, grease, inks, paints and grime from the skin. The ingredients

(*Continued on page 8*)

You get BOTH with

NATIONAL BRUSHES

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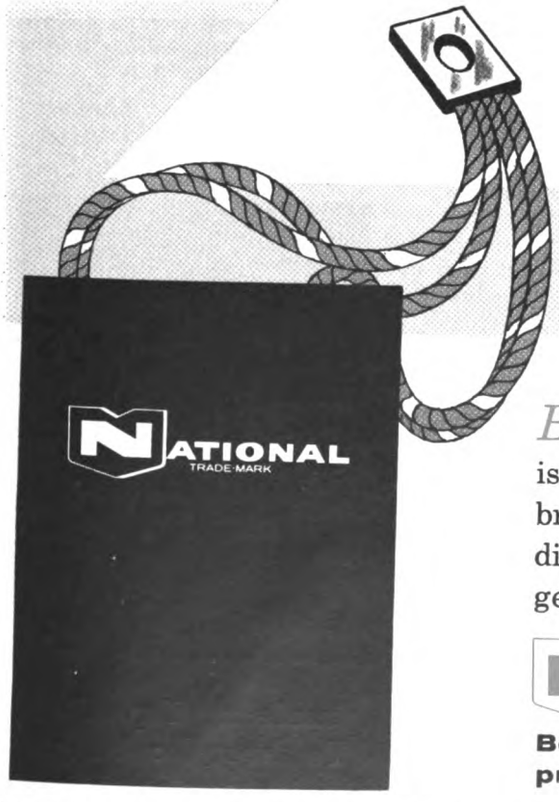
EXCELLENT COMMUTATOR CONDITION

LONG BRUSH LIFE

on equipment of all makes and types
—in all classes of service



Balanced performance . . .
is the big reason why more "National" brushes are both approved and used on diesel-electric traction motors and generators than all other brands combined.

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Best for all types of equipment...
preferred for all types of service

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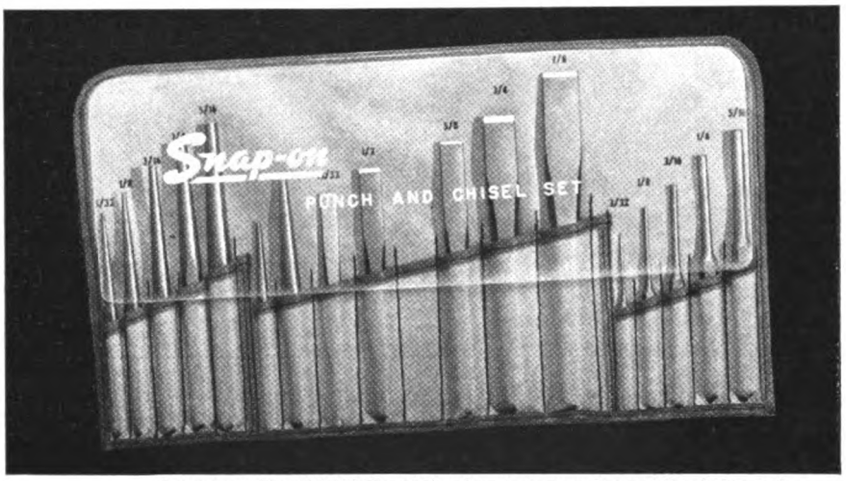
Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

Cut Clean, Punch True with These New, Extra Tough...

Snap-on CHISELS and PUNCHES



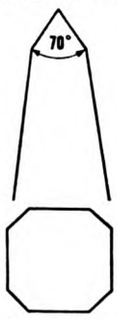
Snap-on set No. PC-170-K contains five starter punches and five drift punches 3/32 to 5/16 in.; five chisels 13/32 to 7/8 in.; and two sizes of center punches. Sizes are clearly marked on protective kit bag as illustrated.

This new *Snap-on* chisel and punch set contains the basic tools to handle a wide range of jobs. A mechanic can select the right chisel, starter punch or drift punch to get cleaner, more exact results, longer tool life.

Here is why experienced mechanics prefer *Snap-on:*

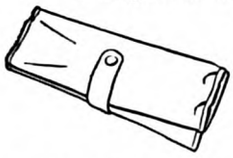
Special Steels scientifically heat-treated for long life. High silica, manganese, molybdenum steel is heat-treated under controlled atmosphere for uniform hardness. Chisel and punch heads are then induction-drawn to reduce hardness to just the right degree. The result is a controlled-mushrooming, long-life striking surface.

70-Degree chisel edge cuts better, stays sharp longer. Exhaustive tests by *Snap-on* engineers show that by shaping cutting edge to a 70-degree angle, the chisel cuts better, stays sharp longer.



New Octo-Square shape for firm, comfortable grip. *Snap-on* chisels and punches are square shaped with beveled corners to give user a better, more comfortable surface for firm control, greater safety, and prevent tool from rolling out of reach.

New-Style hold-tight kit bag. New kit bag folds easily — has a transparent flap which keeps tools from dropping out.



This chisel and punch set is one of many fine *Snap-on* tool sets. The *Snap-on* representative who calls on you can show you a complete range for production or maintenance work.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
Railroad Division
8130-E 28th Avenue • Kenosha, Wisconsin

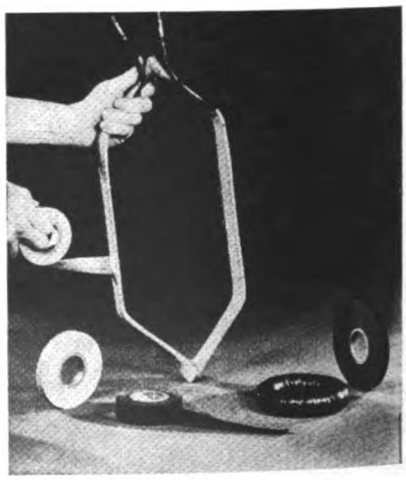
EQUIPMENT

(*Continued from page 6*)

are mild and odorless, and pH is almost neutral. The cleaner contains no harsh alkalis or abrasives and repeated use, it is said, will not cause a "defatting" of the skin. A relatively high amount of Lanolin is used in the cleaner and it is mildly perfumed. *West Disinfecting Company, Dept. RLC, 42-16 West Long Island City 1, N. Y.*

Portable Gantry

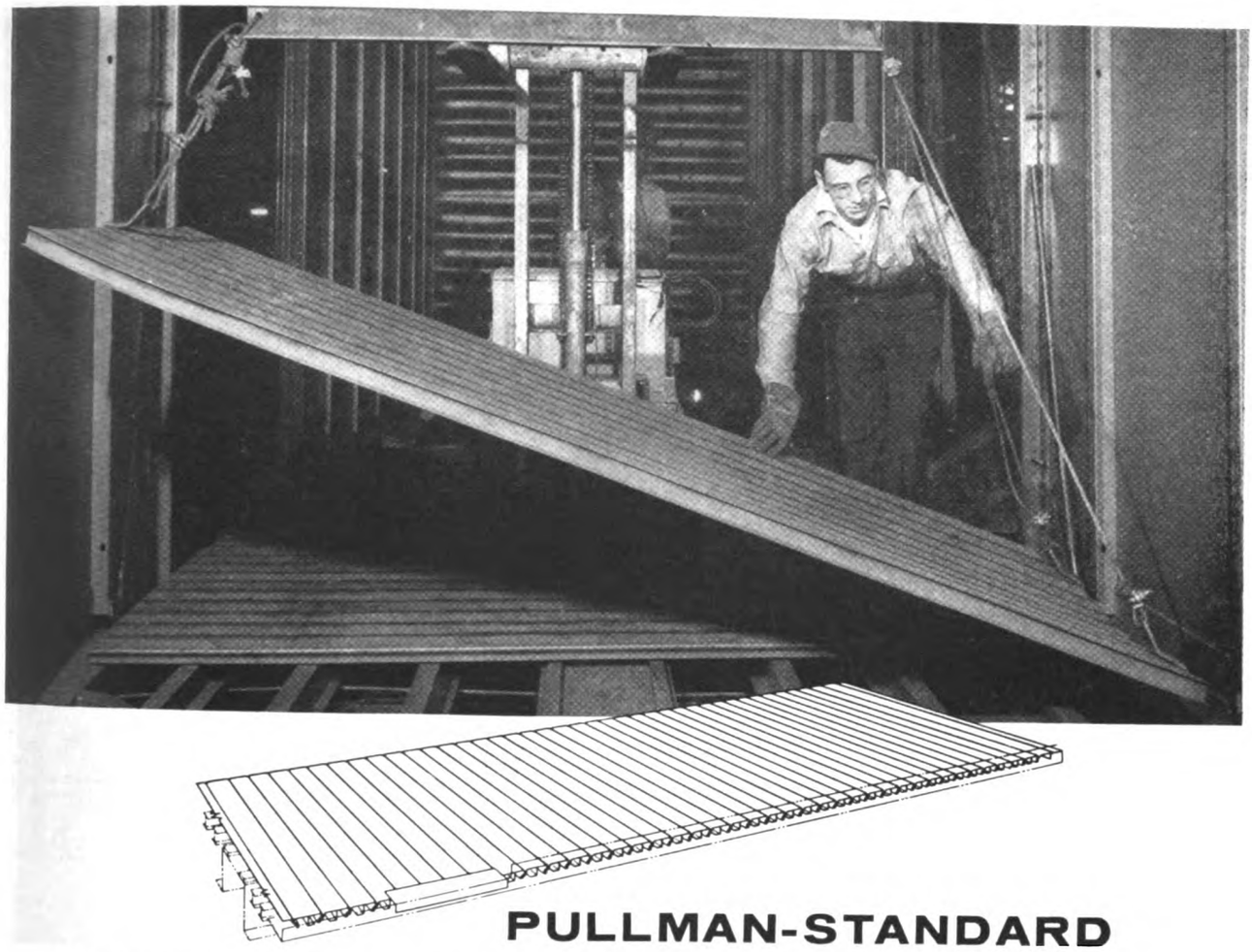
An adjustable height gantry, light enough to be erected anywhere by two men, has a maximum height of over 14 ft. The legs have 6 ft adjustment, permitting setups over high obstructions, or where headroom is low. The I-beam, of a light, strong aluminum alloy, is 10 ft long and weighs only 65 lb. Each of the removable end supports is a complete tripod and can be used as a convention tripod. *B. E. Wallace Products Company, Dept. RLC, Exton 20, Pa.*



Insulating Tape Conforms To Irregular Shapes

A new varnished polyester web tape said to have a higher dielectric strength, a lower power factor, lower moisture absorption and greater conformability

(*Continued on page 16*)



PULLMAN-STANDARD

NAILABLE STEEL FLOOR

provides 33% more nailing space... plus exceptional nail holding power

Cost and service conscious railroads all over the Great American Railway System are replacing wood decking with long-lasting, easily installed Pullman-Standard Nailable Steel Floor. Prominent carriers have over 2500 car sets of this outstanding lading and equipment protection product now in service or on order with Pullman-Standard.

Behind these users' decisions to specify Pullman-Standard Nailable Steel Floors is the knowledge that they are built to provide exceptional durability and strength plus superior nailholding power. And floor maintenance is minimized . . . cars stay in service longer. Costly floor repairs and cooperage are practically eliminated.

The P-S Nailable Steel Floor design includes ample nailing space, contributing to lading security for your shippers. 99 car-width grooves in a 50'-6" box car and 79 in a 40'-6" box car means 33% more nailing space than other steel floors. Permits any conventional arrangement of car bracing, blocking or bulk-heading.

For complete details on this exceptional lading protection and car maintenance-reducing product by Pullman-Standard, write for literature or contact your nearest P-S sales office.

- **P-S design provides exceptional nail holding power with any size nail from 16d to 40d.**
- **Steel angle supports and plank joints provide floor support every three inches . . . help prevent crushing and dishing by heavy lift trucks and racks.**
- **P-S narrower planks on 6" centers provide greater strength and more nailing grooves.**
- **P-S flexible nailing joint snaps back . . . retains original holding power even after use of 30d or 40d nails.**
- **1/16" underframe clearance built into plank joints prevents offsetting . . . planks are always level.**

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WORLD'S LARGEST BUILDER OF ROLLING STOCK

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CAR MANUFACTURING COMPANY

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BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

AAR Atomic Energy Report

Mechanical Research Report MR-280 —Feasibility of Atomic Energy for Use on American Railroads, dated January 1957, is now ready for distribution.

The report covers three sections, the second section being a study made by an atomic engineer engaged for this purpose. The first and third sections represent the AAR analysis of the atomic engineer's report and also information obtained independently, but related by references to the report of the atomic engineer.

New Shops Under Way

The *Chicago & North Western* is spending $4,985,665 to construct new car-shop facilities at Clinton, Ia.

The *Illinois Central* shops at Paducah, Ky., completed in 1927 for the repair and building of steam locomotives, will be converted to handling repair and rebuilding of diesels. The IC expects complete conversion from steam to diesel power in about two years, and during this time shop conversion work will be done so as to have complete facilities available when full dieselization is accomplished.

The shops will still continue to manufacture parts used in building and repair of freight cars, and other parts used in various departments over the entire railroad.

GM Tech Tests Free-Piston Engine

The free-piston engine, now out of the laboratory stage, is ready to compete on its own for power jobs, according to Arthur F. Underwood, manager of General Motors Research Staff Activities, in his speech before the Society of Automotive Engineers' New York Section on April 11. Large-size free-piston turbine combinations, he said, now have a fuel economy in the range of similar size diesels. A large test unit (1,250 gas horsepower) at the GM Technical Center has been operated by the GM Research Staff's mechanical development department with petroleum fuels ranging from gasolines to bunker C crude and shale oils.

The turbine unit, which produces the power from a free-piston gasifier, operates at maximum temperatures of 900 deg F, low enough to obviate high temperature alloys for turbine blades, such as those required for aircraft turbojet and turboprop engines. This low temperature, Mr. Underwood said, also permits engineers to use two or more identical gasifier units to pump gases into a single power turbine. "In this manner," he said, "it is possible to . . . obtain large horsepower installations that would be quite impractical by ordinary diesel engine practice. Thus, with a 1,000-hp unit, it would be possible to obtain up to 20,000 hp by paralleling 20 one-cylinder (gasifier) engines. On the other hand, to attempt to develop this horsepower by conventional diesel practice can become quite a mechanical engineering problem . . ."

So far as the free piston engine's future is concerned, Mr. Underwood believes it will appear first where diesel power now is used, particularly small-size generating up to 400 hp. "We believe the free-piston gasifier will find definite areas where it will replace other forms of power," he told the SAE.

First National Railroad Apprenticeship Conference

The first National Railroad Apprenticeship Conference will be held in Houston, Tex., July 18-20, according to Harold M. Hoffmeister, assistant to chief mechanical officer, Missouri Pacific, and chairman of the National Roalroad Conference. The meeting, to be held in conjunction with the ninth annual Southern States Apprenticeship Conference, was developed as a result of recommendations of special committees set up to study the desirability of such a con-

(Continued on page 12)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE APRIL ISSUE

FREIGHT-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Cap., Tons*	*Other Detail*
FLORIDA EAST COAST:				
Magor Car	150	Gondola	70	These orders for 255 cars subject to court order. Gondolas would be delivered first quarter of 1958; both types of hoppers fourth quarter 1957.
ACF Industries	50	Open-top hopper	70	
Pullman-Standard	55	Covered hopper	70	
CHICAGO GREAT WESTERN:				
ACF Industries	15	Tank	—	19,000-gal. capacity. Cost, $180,000. Delivery July or August.
GREAT NORTHERN:				
Pullman-Standard	150	Covered hopper	70	Cost, $1,500,000. Delivery expected first quarter 1958.
ST. LOUIS SOUTHWESTERN:				
Bethlehem Steel	50	Gondola	70	Estimated cost, $450,250. For January delivery.
Pullman-Standard	100	Covered hopper	70	Estimated cost, $953,500. For October delivery.
UNION TANK CAR CO.:				
Company shops	22	Tank	—	10,000 gal. capacity. For fourth quarter delivery.
	2	Tank	—	8,000 gal. capacity. For fourth quarter delivery.
WABASH:				
Bethlehem Steel	100	Gondola	70	For January delivery.
Greenville Steel Car	50	Covered hopper	70	For June delivery.

INQUIRIES AND NOTES

FREIGHT CARS:

Baltimore & Ohio.—Requested bids for construction of 2,000 70-ton, open-top, drop-bottom hopper cars.

Canadian Pacific.—Appropriated $43,893,705 for 1957 purchase of 4,325 freight cars, and $32,238,323 for purchase of 157 diesel locomotives units, according to N. R. Crump, CPR president, in annual report.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
January, 1953	2,828,906	2,219	4,123	6,342	446,059
January, 1954	2,583,486	3,082	3,797	6,879	375,561
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425
1957					
January	2,767,060	3,373	6,121	9,494	291,453

12 Powerful New Air Grinders

★ 50% more power ★ Fewer parts ★ Weight cut down ★ Interchangeable parts ★ Available in 4 speeds

THOR introduces the No. 4 series air grinders—12 new tools more powerful, lighter, and more foolproof than any ever offered.

What a choice! Four models with butterfly throttle, four with grip throttles, four with lever throttles.

Each of the three types is available in speeds of 4,500, 6,000, 9,000 and 12,000 r.p.m. Thor also offers a complete line of grinder accessories. Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

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Take your pick from the newest most complete, most versatile air grinder line anywhere.

5V VERTICAL GRINDER
7½ lbs. 4,500, 6,000, 8,000 r.p.m. Sanding discs to 9" diameter, depressed center wheels to 7", cup or wire brushes to 6". Power increased 50%. 4-position throttle.

25G DIE GRINDER
Weight only 2 lbs. yet develops 37% more power than its predecessor. Fewer parts. 20,000 r.p.m.

3G GRINDER FOR CASTINGS
3 lbs. 11 oz. 7,000, 10,000, 15,000, 18,000 r.p.m. available. Power increased 18%, weight decreased 16%. Wheel sizes 1½" to 3".

NEWS

(*Continued from page 10*)

ference for the railroad industry.

Conference speakers will discuss qualifications and selections of apprentices; related instructions and the use of labor management committees; job rotation and work schedules; reducing turnover and record keeping; training in each craft, and what happens to apprentices upon completion.

Conference registration will start on Wednesday, July 17, at the Rice Hotel. Entertainment for representatives attending the Railroad Conference has been planned by the Southern States Apprenticeship Conference.

Miscellaneous Publications

"HOW TO SELECT A FIRE EXTINGUISHER." Chart lists basic types of extinguishers and shows at a glance which to use against the three classes of fire: Class A—wood, paper, rubbish, etc.; Class B—volatile liquids; Class C—electrical fires. Describes effects of temperature, operating ranges for each type of extinguisher, how various extinguishing agents kill fire, etc. *Fire Equipment Manufacturers' Association, Inc., Suite 759, 1 Gateway Center, Pittsburgh 22. Free.*

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE. A major portion of this eleventh edition has been completely rewritten. It covers, in eight sections, all phases of arc welding—history, nomenclature and processes, weldability, mild steel procedures, manufacturing cost data, machine design, structural design, applications and reference data. *Lincoln Electric Company, Cleveland. Price, $3.*

Personal Mention

Belt Railway of Chicago

Clearing, Ill.

H. SMALLWOOD, road foreman of engines, retired.

WALLACE A. COMBS appointed road foreman of engines.

Canadian National

F. R. LALONDE, road foreman of engines at Port Arthur, Ont., appointed master mechanic at Prince Albert, Sask.

W. O. PHILION, master mechanic at Smithers, B. C., appointed master mechanic at Edmonton, Alta.

J. P. A MARTIN, car foreman at Senneterre, Que., appointed car foreman at Garneau, Que.

J. L. A. GAGNE, assistant car foreman at Cochrane, Alta., appointed car foreman at Cochrane, Alta., appointed car foreman at Senneterre, Que.

Chesapeake & Ohio

Clifton Forge, Va.

A. M. HELMINTOLLER appointed road foreman of engines-assistant trainmaster, Allegheny Sub-Division.

E. C. MEADOR appointed road foreman of engines-assistant trainmaster, James River Sub-Division.

Ashland, Ky.

S. R. WARNICK appointed road foreman of engines-assistant trainmaster, Ashland-Russell Division.

Elgin, Joliet & Eastern

LOUIS J. VERBICH, car foreman at Gary, Ind., appointed car foreman at Joliet, Ill.

PETE J. BIANCO, JR., appointed car foreman at Gary, Ind.

Erie

STANLEY C. LUND, general foreman passenger cars, Jersey City, N. J., retired.

MICHAEL J. FEDORKA, division car foreman, Penhorn, N. J., appointed division car foreman, freight and passenger-car departments, at Jersey City, N. J..

Gulf, Mobile & Ohio

F. W. A. REAGAN, mechanical foreman at Bogalusa, La., retired.

D. B. JOHNSON, JR., carman supervisor at Laurel, Miss, appointed mechanical foreman at Bogalusa, La.

New York Central

J. H. MACKINNON appointed assistant industrial engineer at New York.

Beech Grove, Ind.

R. L. PASSEHL appointed general foreman.

S. A. CEDERHOLM appointed process engineer.

F. E. BRITTON appointed methods and production engineer.

R. T. TOMLINSON appointed assistant general foreman.

(*Continued on page 14*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

Item No.		Month of January 1957	Month of January 1956
	FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)		
3	Road locomotive miles (000) (M-211):		
3—05	Total, steam	2,570	4,599
3—06	Total, Diesel-electric	37,026	37,084
3—07	Total, electric	714	736
3—04	Total, locomotive-miles	40,575	42,643
4	Car-miles (000,000) (M-211):		
4—03	Loaded, total	1,571	1,664
4—06	Empty, total	930	957
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):		
6—01	Total in coal-burning steam locomotive trains	6,777	10,847
6—02	Total in oil-burning steam locomotive trains	235	1,410
6—03	Total in Diesel-electric locomotive trains	104,128	104,563
6—04	Total in electric locomotive trains	2,123	2,185
6—06	Total in all trains	114,218	119,776
10	Averages per train-mile (excluding light trains) (M-211):		
10—01	Locomotive-miles (principal and helper)	1.02	1.03
10—02	Loaded freight car-miles	41.3	41.9
10—03	Empty freight car-miles	24.5	24.1
10—04	Total freight car-miles (excluding caboose)	65.8	66.0
10—05	Gross ton-miles (excluding locomotive and tender)	3,004	3,019
10—06	Net ton-miles	1,357	1,370
12	Net ton-miles per loaded car-mile (M-211)	32.8	32.7
13	Car-mile ratios—Loaded freight cars (M-211):		
13—03	Per cent loaded of total freight car-miles	62.8	63.5
14	Averages per train hour (M-211):		
14—01	Train miles	18.7	18.8
14—02	Gross ton-miles (excluding locomotive and tender)	55,747	56,029
17	Car-miles per freight car day (M-240):		
17—01	Serviceable	43.9	46.0
17—02	All	42.3	44.2
18	Average net ton-miles per freight car-day (M-240)	872	917
20	Per cent of home cars of total freight cars on the line (M-240)	43.9	42.2
	PASSENGER SERVICE (DATA FROM I.C.C. M-213)		
3	Road motive-power miles (000):		
3—05	Steam	20,288	20,740
3—06	Diesel-electric	1,258	1,323
3—07	Electric	—	—
3—04	Total	418	1,000
4	Passenger-train car-miles (000):		
4—08	Total in all locomotive-propelled trains	222,282	235,290
4—09	Total in coal-burning steam locomotive trains	3,112	5,894
4—10	Total in oil-burning steam locomotive trains	159	2,524
4—11	Total in Diesel-electric locomotive trains	204,081	211,858
12	Total car-miles per train-mile	9.66	9.80
	YARD SERVICE (DATA FROM I.C.C. M-215)		
1	Freight yard switching locomotive-hours:		
1—01	Steam, coal-burning	180,519	259,592
1—02	Steam, oil-burning	7,871	28,933
1—03	Diesel-electric[1]	3,929,001	3,895,180
1—06	Total	4,120,834	4,186,805
2	Passenger yard switching hours:		
2—01	Steam, coal-burning	4,814	7,720
2—02	Steam, oil burning	685	3,340
2—03	Diesel-electric[1]	256,797	252,070
2—06	Total	288,068	289,614
3	Hours per yard locomotive-day:		
3—01	Steam	5.9	5.8
3—02	Diesel-electric	15.7	15.8
3—05	Serviceable	15.8	15.7
3—06	All locomotives (serviceable, unserviceable and stored)	14.6	14.1
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.81	1.74
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.80	.76

[1] Excludes B and trailing A units.

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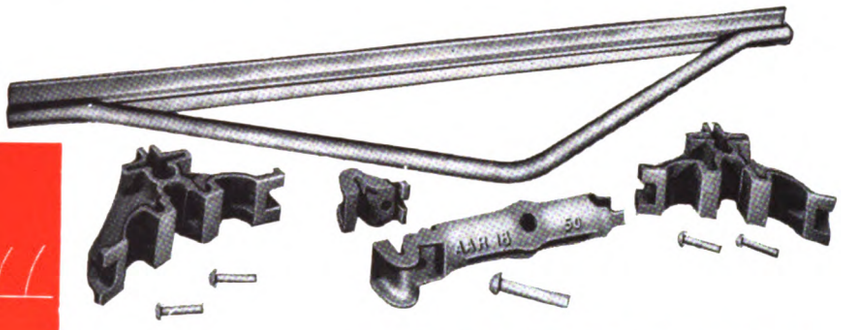
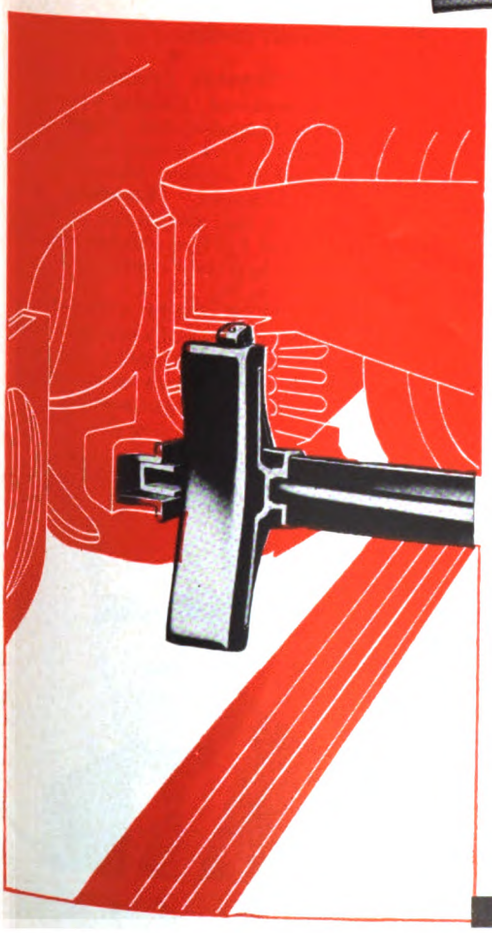
A RECOGNIZED STANDARD FOR MORE THAN 30 YEARS

Whether for Conventional Hanging or for UNIT TRUCKS Davis Solid Truss Brake Beams are DECISIVELY SUPERIOR.





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OTHER IMPORTANT FEATURES:

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Plant and General Office—Johnstown, Pa.
Boston • Chicago • Cleveland
Richmond • St. Louis • San Francisco

PERSONAL MENTION . . .

(*Continued from page 12*)

Norfolk & Western

E. D. STRONG, general foreman at Williamson, W. Va., appointed general foreman at Bluefield, W. Va.

F. H. MCFADDEN, blacksmith shop foreman at Roanoke, Va., shops, appointed general foreman, car department.

E. E. BARTON, assistant machine shop foreman at Roanoke, Va., appointed blacksmith shop foreman.

C. C. RUTH, gang leader at Portsmouth, Ohio, shop, appointed gang foreman.

Pennsylvania

S. J. PAUL, assistant road foreman of engines, Oil City, Pa., appointed assistant trainmaster-assistant road foreman of engines, Phillipston, Pa.

H. A. MCGOWAN, enginehouse foreman, Elmira, N. Y., appointed engineer-cost control (ME), Buffalo, N. Y.

T. J. PARK, enginehouse foreman, Buttonwood, Pa., appointed motive power foreman, Elmira, N. Y.

O. R. HIGHFIELD, foreman car repairs, Buttonwood, Pa., appointed motive-power foreman.

O. J. DEAN appointed general foreman, Columbus, Ohio.

R. W. YOUNG, appointed foreman, enginehouse and car shop, Lancaster, Ohio.

G. R. LOWE appointed assistant foreman, machine shop, Columbus, Ohio.

WILLIAM HELM, JR., acting assistant foreman, Conway, Pa., appointed foreman—electrical maintenance.

A. E. HOLT, assistant foreman, appointed foreman at Altoona, Pa.

E. E. MCINTIRE, gang foreman, appointed assistant foreman at Altoona, Pa.

St. Louis Southwestern

H. W. SEIGEL, mechanical foreman at North Little Rock, Ark., retired.

Southern

General foremen: *Alexandria, Va.:* HARRY B. DUNDON, JR. *Atlanta, Ga.:* THOMAS S. HOOPER, CLAUDE O. GARVIN, PRINCE B. ELEAZER, JR. *Charlotte, N. C.:* WILLIAM M. GADDY, WILLIAM M. ALMON. *Columbia, S. C.:* H. WILBUR SANDERS, JAMES C. POPE. *Durham, N. C.:* ROBERT C. MIDDOUR. *Greensboro, N. C.:* SAMUEL R. BRUCE. *Greenville, S. C.:* MILTON H. MCFARLAND. *Knoxville, Tenn.:* JOHN T. ALLEN. *Spencer, N. C.:* SAMUEL E. BUTLER, JAMES D. DEMARCUS, JR., GEORGE L. SOUTHER, JR., WILLIAM T. ELEAZER, CHARLES M. JOINER.

Obituary

HAROLD E. NIKSCH, superintendent of motive power and equipment of the Elgin, Joliet & Eastern, died recently.

C. T. WATKINS, JR., general foreman at Roanoke, Va., shops of the Norfolk & Western, died on February 21.

FRED W. RUTTGER, master mechanic, Morris Park shops, Richmond, Hill, L. I., died on April 11.

Supply Trade Notes . . .

WESTINGHOUSE AIR BRAKE COMPANY.—AIR BRAKE DIVISION.—*R. A. Mitchell* and *C. H. Lang* have been appointed representatives for the Central District, with headquarters at Wilmerding, Pa. Mr. Mitchell had been district engineer and Mr. Lang, service engineer.

■

TEXAS COMPANY.—The headquarters of J. G. Wallace, assistant manager of railway sales, have been moved from New York to Chicago. Mr. Wallace will serve the Chicago, St. Louis, St. Paul, and San Francisco Divisions.

■

SIMPLEX WIRE & CABLE CO.—*E. F. Galvin* has been appointed manager and *Clarence Beard*, assistant manager, New England district. Mr. Galvin succeeds *Arthur W. Coombs*, retired. *E. A. Carlson* succeeds Mr. Galvin as manager of railroad sales, and *Paul J. McHale* takes over the railroad sales duties previously handled by Mr. Carlson in the New England area.

■

FARR COMPANY.—*Fred Richardson* has been appointed Southern Division sales manager at New Orleans; *Ken DeBaun*, Eastern divison sales manager at New York, and *Andrew Gourley*, Western Division sales manager at Los Angeles. *Ken Baker*, has been appointed sales engineer in charge of the Washington, D.C., office.

■

GIBBS & HILL, INC.—*W. J. Madden*, formerly assistant electrical engineer, Pennsylvania, has entered the service of G&H.

■

GOULD - NATIONAL BATTERIES, INC.—*Lewis L. May, Jr.*, has been appointed Gulf regional manager of the Industrial Division, with headquarters at 4935 Cass St., Dallas, Texas.

■

JOHNS-MANVILLE CORP.—*Raymond P. Townsend*, vice-president and manager for transportation industry, has retired to act as a manufacturer's representative and a consultant on railroad and industrial sales problems. Mr. Townsend will be located in New York.

■

CRUCIBLE STEEL COMPANY OF AMERICA.—*William B. Downes* has been appointed manager-Stainless-Steel Sales Division, with headquarters in Pittsburgh. Mr. Downes had been assistant division manager.

■

DOW CORNING CORPORATION.—The *Continental Diamond Fibre Corporation*, Valparaiso, Ind.; *Permacel Tape Corporation*, New Brunswick, N. J., and the *Quaker Rubber Divison, H. K. Porter Company*, Philadelphia, have taken over the manufacture of Silastic Type R and RG tape and cloth originally developed by Dow Corning.

■

EDGEWATER STEEL COMPANY.—Edgewater has opened a new office in the Eig Building, Silver Spring, Md., with *R. C. Carrick*, formerly service engineer in Pittsburgh, as district manager.

(*Turn to page 93*)

R. A. Mitchell

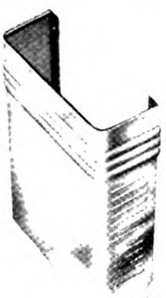
C. H. Lang

E. A. Carlson

No. 803
Service Plate

modern cars and Adlake hardware...

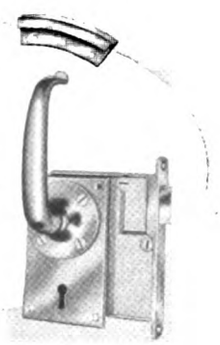
MADE FOR EACH OTHER



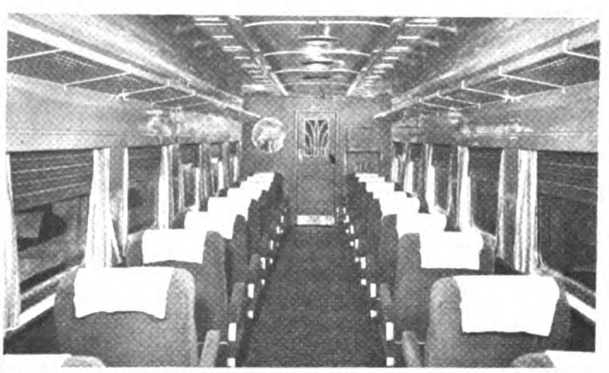
No. 5
Used Towel
Receptacle

It takes Adlake hardware to harmonize with modern car interiors. Attractive yet practical! You'll accent modern design with the Adlake line!

Note the thoughtful, functional design of Adlake's easy-to-use control plates...in the end locks that come to hand so naturally ...in the lighted, continuous luggage racks...in the flush, unobtrusive coat hooks...in the good looks and efficiency of even the used towel bins...



No. 1437
End Door Lock



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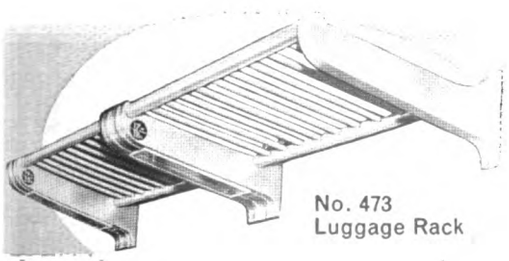
Each Adlake item is of top quality, and economical in service for that reason. Adlake hardware for railroad cars is in one handy catalog. Write for it...



No. 473
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Adams & Westlake

COMPANY

Established 1857

ELKHART, INDIANA, New York, Chicago

Manufacturers of Specialties and Equipment for the Railroad Industry

NEW *Utility* PRESS BY

FJELLMAN AMERICAN

for Forcing, Bending, Forming, Drawing up to

200 TONS

ONLY 8'7" D. x 4'5" W. x 11'3" H.

Here's a unique, compact press — ideal for custom forming where pressures up to 200 tons are required — with infinitely variable pressure-control. Its goose-neck design, 300° loading arc, high throat and long, exacting stroke make the Fjellman American utility press an extremely versatile machine for your custom production and repair department assignments.

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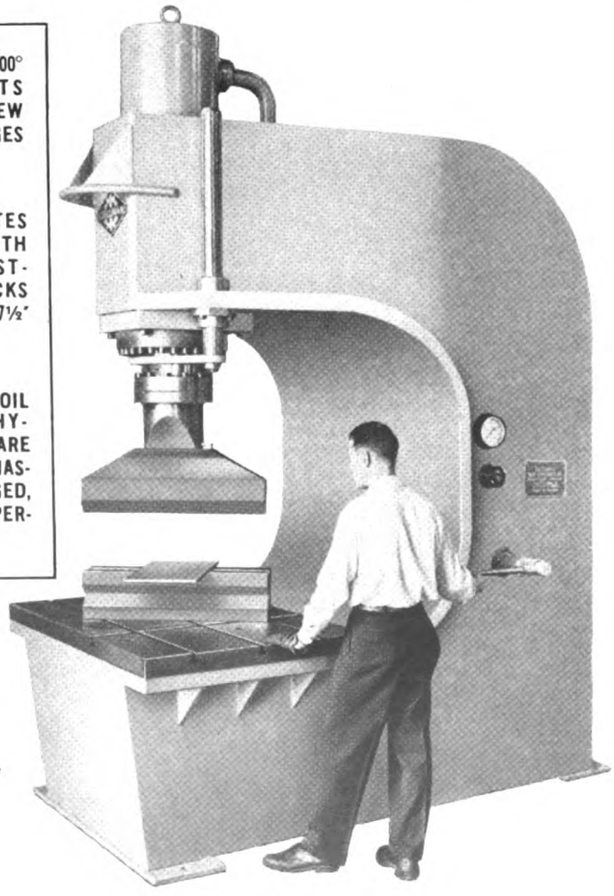
▶LOADS THROUGH A 300° OPENING. PERMITS OPERATOR FULL VIEW OF WORK AND GAUGES EVERY MOMENT.

▶PRESSURE REGULATES IN AN INSTANT WITH FINGERTIP ADJUSTMENT. PISTON LOCKS ANYWHERE WITHIN 27½" STROKE.

▶TWO-STAGE PUMP, OIL RESERVOIR AND HYDRAULIC SYSTEM ARE HOUSED WITHIN MASSIVE FRAME. RUGGED, CLEAN, EFFICIENT OPERATION.



Write for complete data and specifications

EQUIPMENT

(*Continued from page 8*)

than other varnished insulations has just been announced.

Called Fibremat varnished polyester web tape, it is rated as a Class A insulation material. It is expected to be used in such applications as wrapping field coils, phase insulation in electric motors, insulating generators and transformers and for cable insulation and splicing, as well as other uses.

General properties of the tape include a dielectric strength of 1,650 volts per mil, an elongation of 20 per cent, a water absorption rate of 0.5 per cent after 24-hr immersion and a power factor of 0.02. General resistance to fresh or salt water, acid and alkalies is described as excellent by the manufacturer.

One of the most important properties attributed to the tape, is its extreme conformability in comparison with other forms of coated insulation. Due to the ease of elongation of the polyester web base, the tape can be pulled down tightly while wrapping to eliminate air pockets or voids, and make a neater appearing unit. The elongation of the tape has no marked effect upon its dielectric properties and it can be stretched with a minimum of effort to conform snugly to irregular surfaces. This ability to deform only at the point of pressure is the result of the non-continuous fiber-base. The same property improves its tear resistance.

Because of the easy workability of the tape, workers have found they can apply it faster and prefer its handling qualities. The conformability of the tape has allowed some manufacturers to increase by approximately one-third the dielectric strength of their insulation without increasing the overall dimensions of the completed electrical unit.

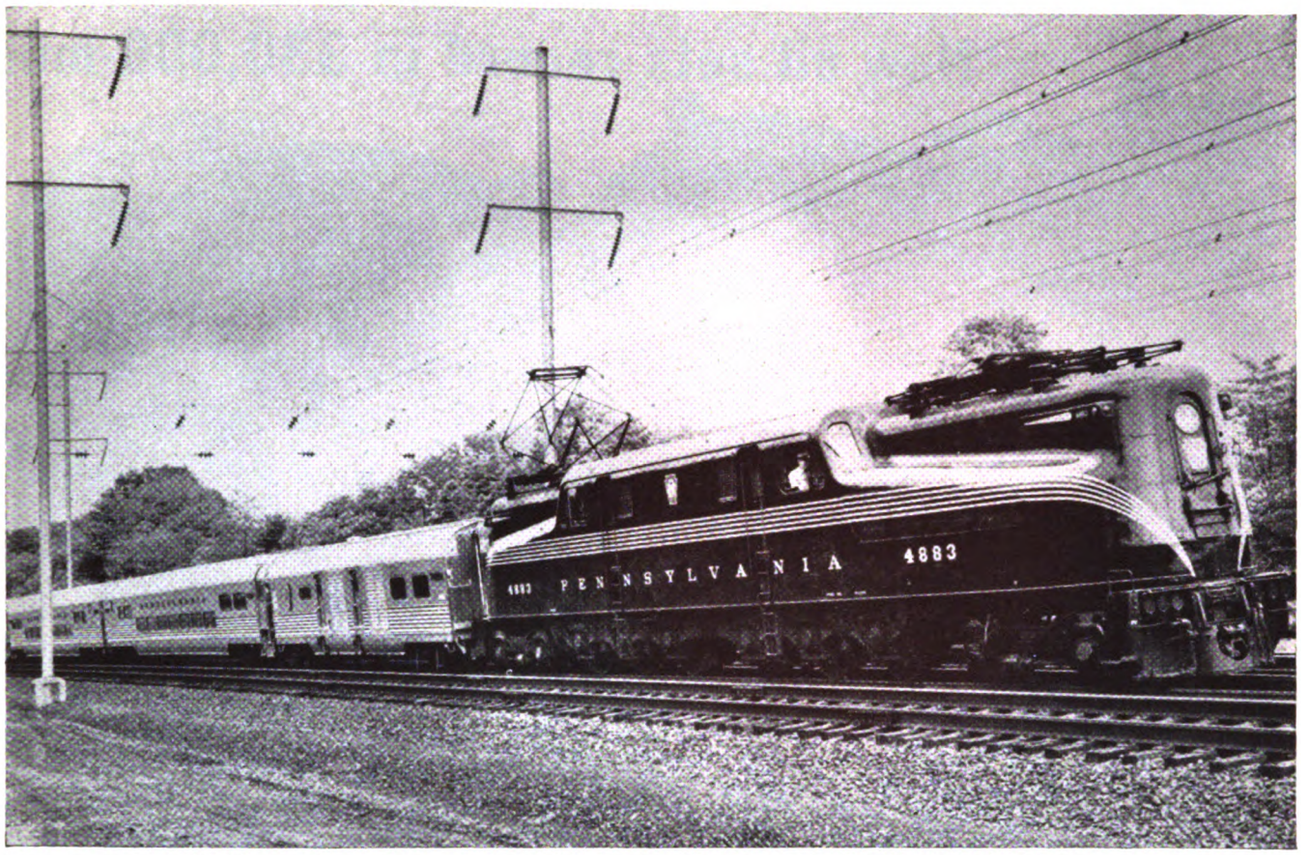
The tape differs from woven fabric tapes in that it is made up of a mat of non-woven polyester fibers in a felted form which is impregnated with a varnish coating. The tape is available in 7 and 10 mil calipers in either black or yellow varnish. Tape widths range from ⅜ in. to 2 in. in 36 yd rolls. *Irvington Division, Minnesota Mining & Manufacturing Co., Dept. RLC, Irvington 11, N. J.*

Plastic to Metal Adhesive

The producers of this cement, developed specifically to bond semi-rigid vinyl to metal and other materials, say its adhesion can be broken only by tearing the vinyl itself. Applied to the metal by roller coat, spray, brush, or dip, the resulting laminate can be deep drawn, punched, cut, drilled or crimped with no reported separation of the piles.

A primer compatible with this adhesive is said to greatly improve bonds between plastisols, organosols and metal.

(*Continued on page 76*)



"The Keystone," new Pennsylvania Railroad stainless steel tubular train features 4-wheel roller bearing trucks, lighter weight, nearly two foot lower silhouette and lower center of gravity than modern conventional cars.

Nylon Insert ELASTIC STOP® nuts used on new tubular train

Self-locking Elastic Stop nuts help reduce maintenance costs by eliminating the need for constant inspection and re-tightening. They contribute to safer operation because they are a one-piece unit with a self-contained locking device that holds anywhere on the bolt without depending upon washers or seating pressures. They help reduce wear on mating parts by maintaining a constant tightness in the fastened joint. That is why the Pennsylvania has used ESNA fasteners on all trucks and for hold-down of all auxiliary equipment on the new "Keystone."

What makes an Elastic Stop nut hold so positively? It's the virtually indestructible red nylon collar, impervious to oils, grease and cleaning compounds, which grips bolt threads with a perfect fit and seals off inner bolt and nut threads against corrosion due to liquid seepage. The locking torque it creates enforces a constant metal to metal pressure on the bolt and nut thread flanks which resists the loosening effects of violent vibration and impact loads. Furthermore, the smooth locking action of the nylon collar does not gall or distort bolt threads. Both nut and bolt remain fully re-usable. For detailed information on vibration-proof fastening methods for locomotive, passenger and freight car applications, write to Railway Sales Div.—Dept. N29-523, 2330 Vauxhall Road, Union, N. J.

ESNA® TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

ROLLPIN TRADEMARK

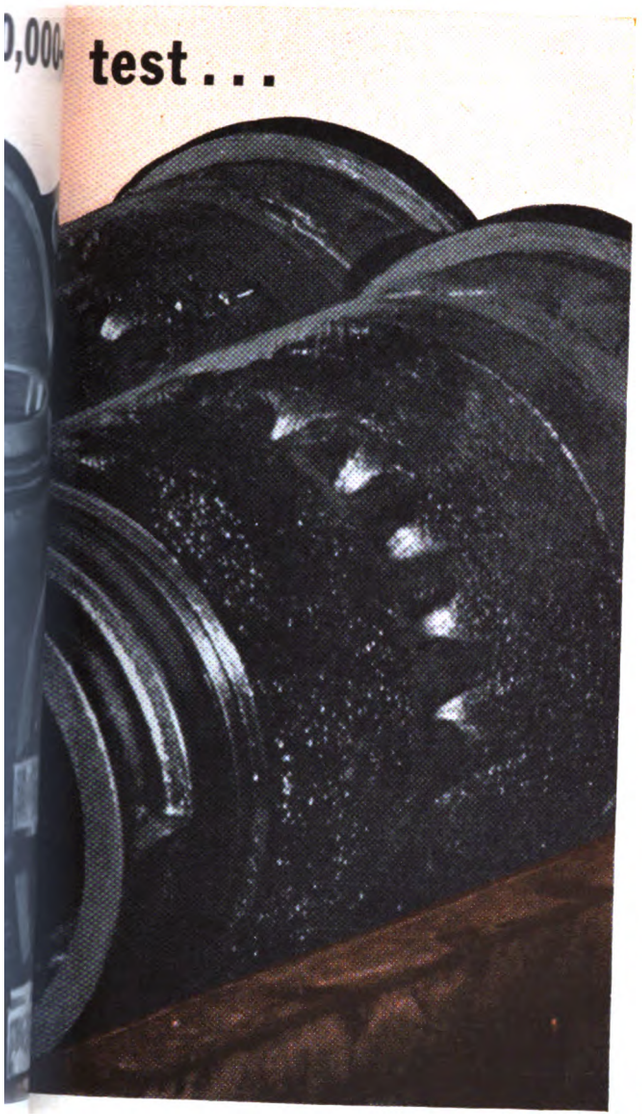
New oil sets record in 330,000-mile GULF DIESELMOTIVE protects rated power of high-output

The pictures tell the story. Gulf's new Dieselmotive 78 keeps engines cleaner — longer. But that's not all. *This new oil enables high-output Diesels to deliver their full rated power . . . under certain conditions, it can actually increase the tonnage ratings!*

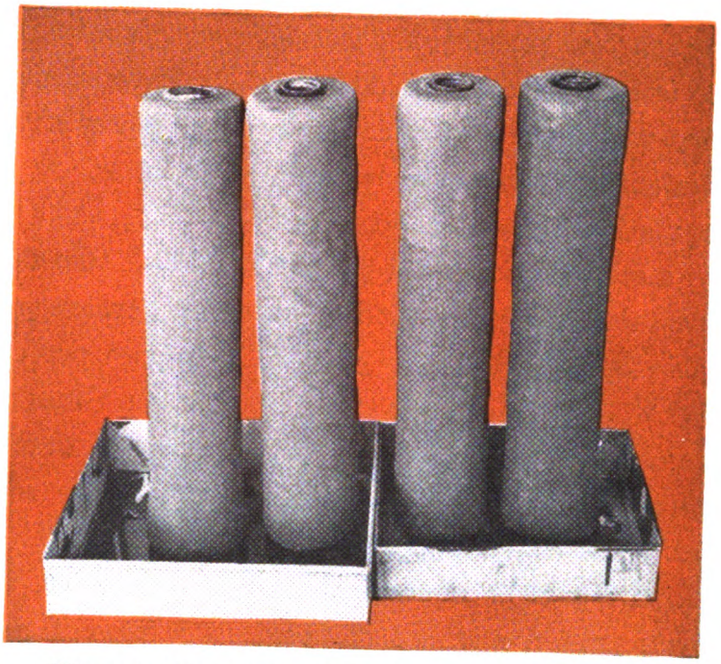
Southern Pacific put Dieselmotive 78 through a series of grueling tests in EMD 567-C units on Southern Pacific lines in Texas and Louisiana. You know the run—from hot and humid lowlands to chilly mountain passes . . . temperatures ranging from 110 to zero degrees. Tough hauls up steep grades . . . long runs through dust, heat and cold.

After 165,825 miles, the engines were disassembled. Rings, pistons and liners showed amazingly little wear. There were no heavy deposits or varnish anywhere. Main bearing shells were so near-new they were re-installed for further service.

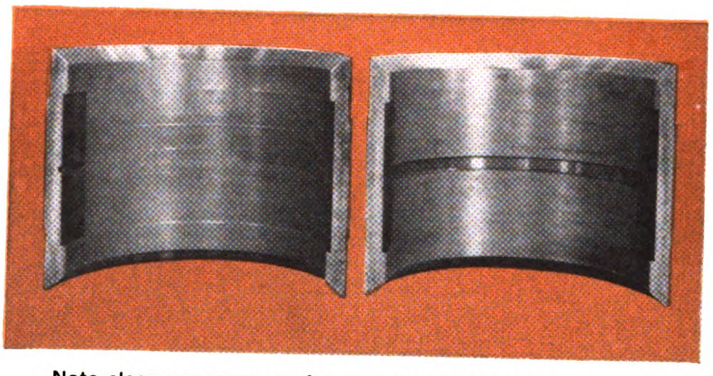
You can see how engines as clean as this deliver all the power built into them. Com-



After 165,825 test miles on Dieselmotive 78, pistons and liners when removed looked like this. All parts were clean, free of deposits and showed negligible wear.



Filters are free of heavy sludge. Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils. This additive reserve insures cleaner engines, less wear, than ever before.



Note clean appearance of connecting rod bearings immediately after removal from engines. Gulf Dieselmotive 78 retains its stability and lubricity even when subjected to high temperatures for extended periods.

78 OIL

engines

pression is maintained, insuring continued high engine efficiency.

Gulf Dieselmotive 78 is now being demonstrated on the Missouri Pacific and Seaboard Airline Railroads. Why don't you try this new and better oil? Merely contact the Gulf engineer at your nearest Gulf office for any help you need. Or, write for more data.

GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

GULF

WILL YOUR RAILROAD BE PREPARED TO GROW?

The ten-year period just ahead is a crucial one for the railroad industry. By every reasonable economic yardstick—anticipated gross national product, population growth, construction activity, steel, chemical, fuel production, etc.—this ten-year period offers undeniable opportunities for growth.

Already, we are cooperating with several roads who have measured this potential. Their conclusions are based on anticipating their equipment requirements well in advance of need. They are laying the groundwork involved through specific year-by-year order planning. Thus orders may be placed sufficiently in advance that deliveries of power will be made when power is required, not months or years later.

On the eve of completing an expansion program that will add forty-two per cent to existing facilities at La Grange, we are in a better position than ever to help you schedule your motive requirements to match your needs. Thus, whether it be new locomotives, upgrading or conversion of present motive-power, unit exchange of components or entirely new products, Electro-Motive can help you plan today for a more rewarding tomorrow.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Ltd., London, Ontario

FACTORY BRANCHES

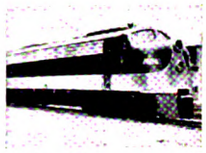
Los Angeles, Calif.
Emeryville, Calif.
Salt Lake City
Robertson, Mo.
La Grange, Ill.
(factory and parts center)
Halethorpe, Md.
Jacksonville, Fla.

BRANCH WAREHOUSES

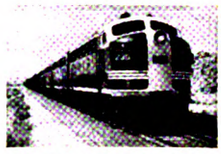
Fort Worth, Texas
Minneapolis, Minn.

These Electro-Motive facilities can help you plan now for a more rewarding future

COMPLETE LINE OF EFFICIENT GENERAL MOTORS LOCOMOTIVES

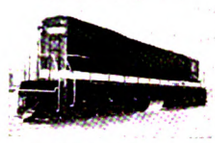


E9 Passenger Unit

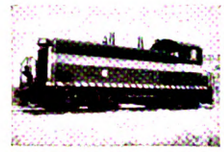


F9 Freight or Heavy-Duty Passenger Unit

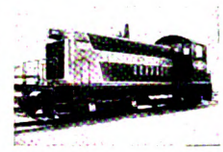
GP9 General Purpose Unit



SD9 Six-Motor Road Switcher



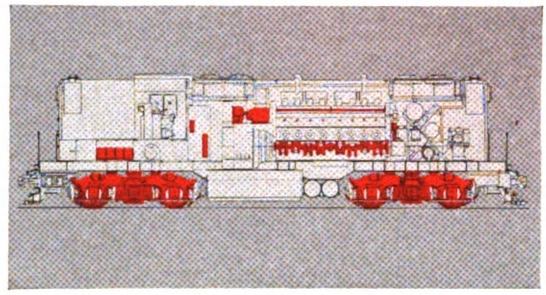
SW1200 125-Ton Switching Unit



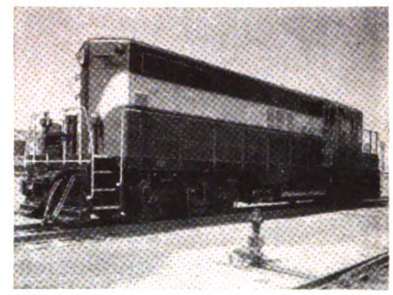
SW900 115-Ton Switching Unit

CONVERSION FACILITIES MAKE NEW LOCOMOTIVES FROM OLD

FT as it was delivered to us for converting to a modern GP9.

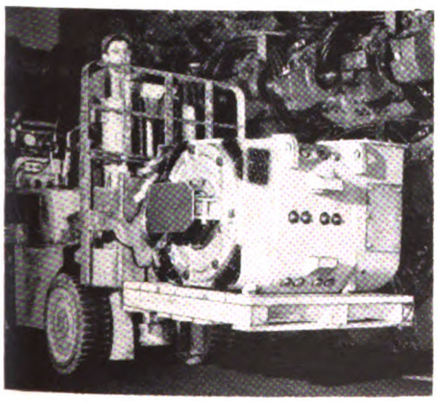


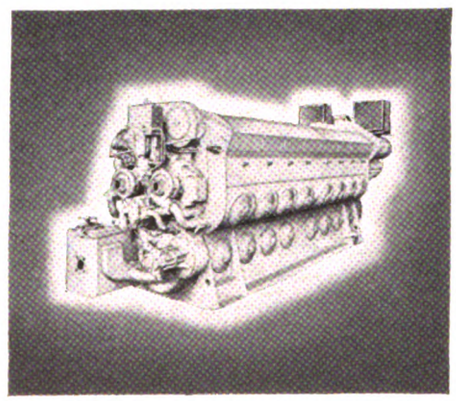
Cutaway showing parts (red) used from FT in conversion process.



Result carries a new locomotive warranty but costs considerably less than a new unit.

UNIT EXCHANGE REDUCES INVENTORY OF MAJOR COMPONENTS

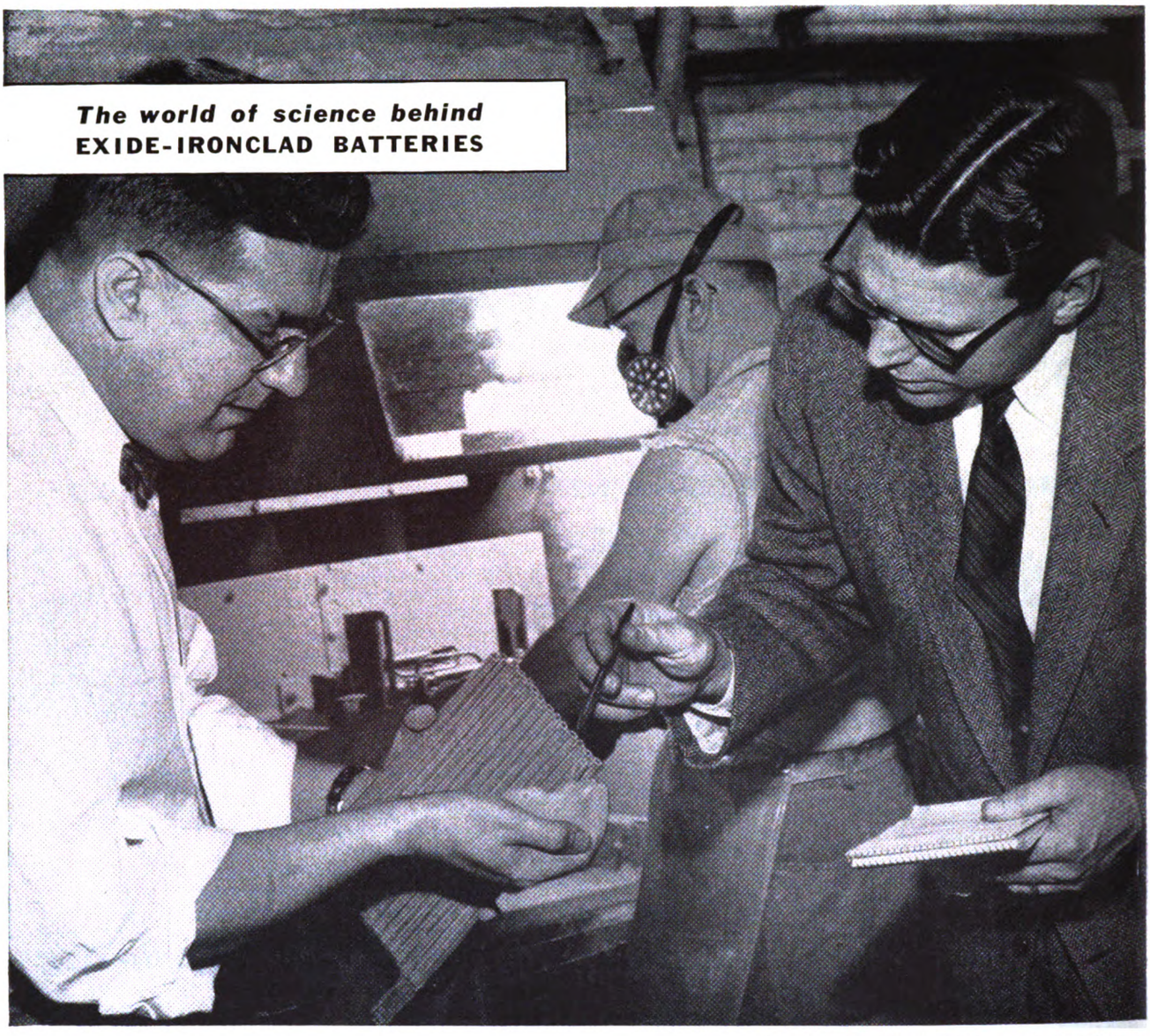




This unique Electro-Motive service offers major locomotive components on an exchange basis. You don't need to hold a locomotive out of service waiting for an assembly to be rebuilt. You can get unit exchange service from any of the branches listed here to help you operate with smaller inventories and reduce maintenance costs with precision, factory-built components that contain all the latest engineering improvements.

STRATEGICALLY LOCATED BRANCHES

A network of Electro-Motive Factory Branches and Warehouses puts genuine General Motors locomotive parts within 24 hours of any point in the United States. Six of the branches, plus our facilities at La Grange, handle remanufacture of major components with the same factory facilities used in original manufacture.



Being interviewed is E. A. Wagner, Product Engineer

"This oxide blend packs more power per ounce"

At the Exide Laboratories—**Reporter:** More power, Mr. Wagner? Do you mean the blend of oxides in Exide-Ironclad is different from that used in other batteries?

Wagner: Absolutely. We can use the more active oxides that give the batteries higher capacity.

Reporter: Why do you say *can?* Can't other batteries use these oxides too?

Wagner: It isn't likely. First, this blend is the result of more than 40 years of Exide research—and it's an Exide exclusive. Second, we can use it successfully because of the unique tubular construction of the Exide-Ironclad positive plate.

Reporter: How does tubular construction help make it a better battery?

Wagner: Because the cylindrical power tubes hold the tiny oxide particles firmly in electrical contact clear through the charge and discharge cycle. So Exide-Ironclad Batteries can maintain their high capacity—even under severe vibration—for years of service.

Reporter: Obviously, this is an important feature of Exide-Ironclad Batteries.

Wagner: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users. Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Phila. 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

Short Cut

To Low Cost Wheel Maintenance

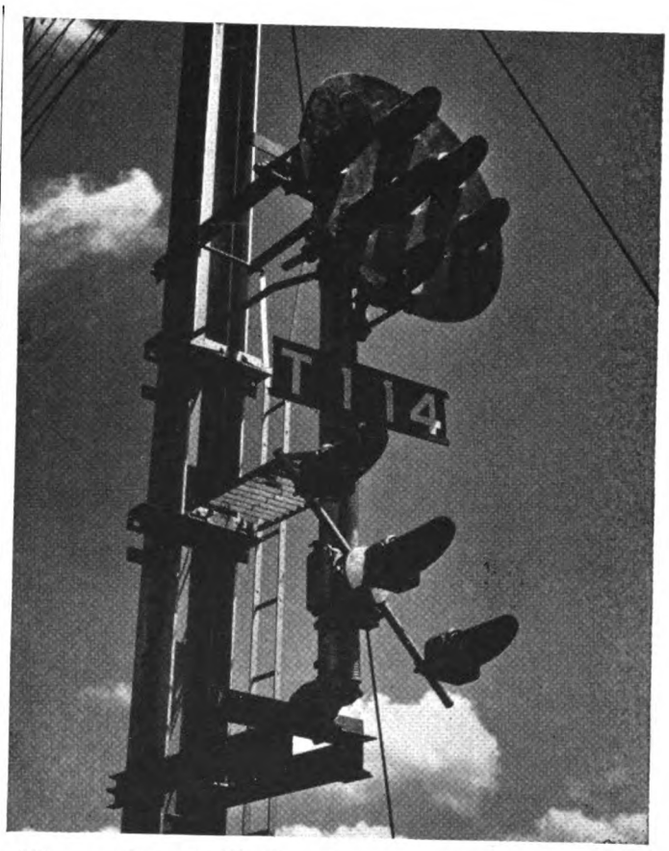
FCC Flange Cutters

ABRASIVE BRAKE SHOES

All Popular Patterns available from stock

WHEEL TRUING BRAKE SHOE CO.

628 West Baltimore
Detroit 2, Mich.



More Ex-Cell-O pins and bushings than any other kind will pass this signal

Over 200 U. S. and Canadian railroads bank on Ex-Cell-O Pins and Bushings. Why?

Because these bushings *last longer* thanks to a super-fine finish and a diamond-hard, specially heat-treated steel case. A giant stock at our warehouses assures fast delivery of any size or quantity—and every order is backed up with an extraordinary service policy. Available assembled or separately, Ex-Cell-O Pins and Bushings wear longer because they're made better.

Order directly from the convenient Ex-Cell-O Catalog . . . or contact your Ex-Cell-O Representative.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

EX-CELL-O FOR PRECISION

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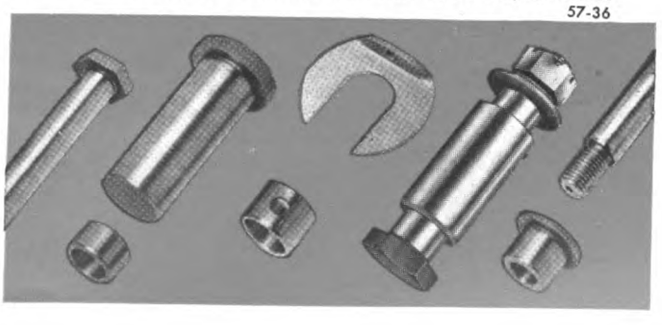
RAILROAD DIVISION • DETROIT, MICHIGAN • LONDON, CANADA

57-36



AIR-PUSH Jumbo Rotary-Seal WINDSHIELD WIPERS

POWER . . . when you need it most!

The economical Air-Push motors have the extra power needed to wipe the larger windshields used on late model locomotives.

Air-Push motors offer: INSTANT STARTING, MORE POWER, LOWER MAINTENANCE COSTS, RUGGED CONSTRUCTION, COMPLETELY REPLACEABLE PARTS . . . that's why Air-Push equipment is used on more than 90% of all diesel operated locomotives.

DON'T BUY A NEW MOTOR — Send your old one to the factory for a warranted major overhaul — at ½ the cost of a new one.

Send TODAY for details!

Make On-The-Job MINOR REPAIRS with the Air-Push REPAIR KITS

Sprague DEVICES, INC.,
MICHIGAN CITY, INDIANA, U.S.A.

LOOK AT

1.

Longer Service Life

All ASF Extended Life Springs are shot-peened—which cold-works surfaces and more than doubles the life of the spring.

ASF

ALL THREE

...before you specify truck springs!

2. Better Performance

A new heat-treating process makes ASF Extended Life Springs far better able to maintain load-carrying capacity—without permanent set.

3. Lower Cost

ASF Extended Life Springs are now available at no increase in cost over conventional springs. Because they last over twice as long, they cut your spring costs per car mile.

E-X-T-E-N-D-E-D L-I-F-E SPRINGS

A contribution to railroad progress...through research by

AMERICAN STEEL FOUNDRIES

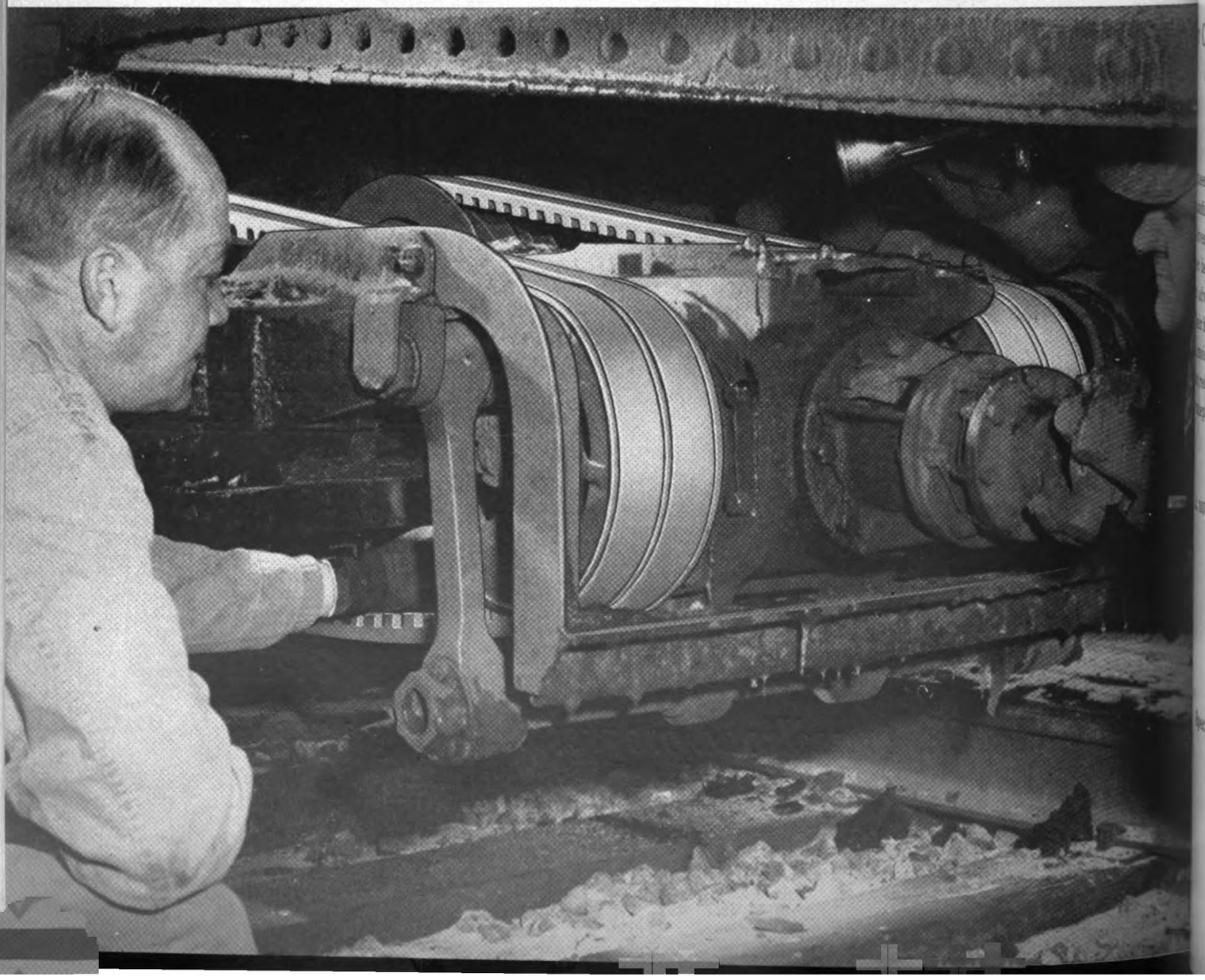
Prudential Plaza, Chicago 1, Illinois

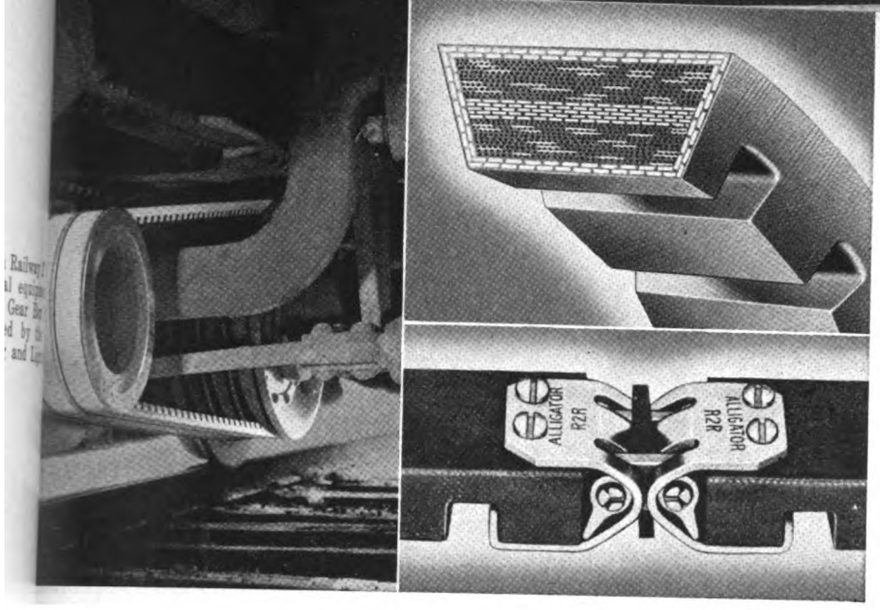
Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

GEARED TO PROGRESS
P R I
MEMBER

Dayton Railway 2" Cog-Belts are original equipment on Safety V-Belt Gear Box Drives manufactured by the Safety Car Heating and Lighting Company.

Dayton 2" Cog-Belts* Deliver





This belt is especially designed for use with connectors — highly resistant to pullouts. For convenience and economy the Dayton 2″ Cog-Belt is available in 100 foot reels.

Steady Power Despite Oil, Dirt, Heat, Moisture

For Car Lighting, Heating and Air Conditioning Units, Dayton 2″ Cog-Belts deliver positive power under all road conditions.

Engineered and built specifically to meet the demanding requirements of railway under-car V-Drives, rugged Dayton 2″ Cog-Belts deliver power dependably and economically under the most adverse weather and road conditions.

Their high resistance to extremes of temperature, moisture, oil and dirt and their low-stretch factor reduces belt maintenance to a minimum, for exceptionally low-cost operation.

The best connections you can have between axle and driven unit are Dayton 2″ Cogs. They deliver positive power, yet cushion shock loads.

An experienced Dayton Railway Engineer will be happy to advise you on the application of Dayton 2″ Cog-Belts to your axle V-Drives or to help you solve any railway V-Drive problem. Just write Dayton Rubber Company, Railway Division, Dayton 1, Ohio.

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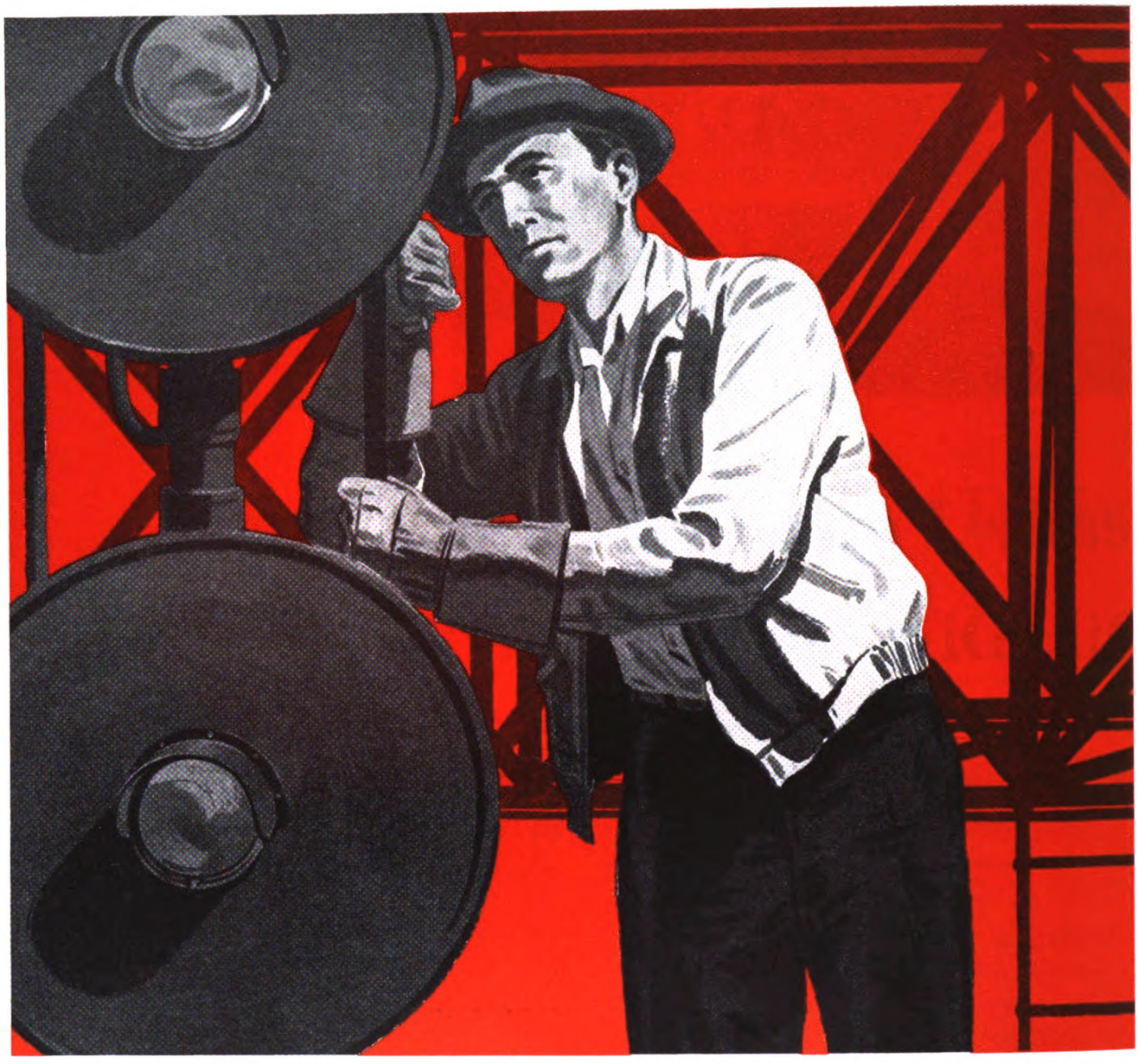
*TM

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, Dallas, Dayton, E. Moline, New York, Rock Island, San Francisco and St. Louis.



Railroad Cables. Helping the railroad industry overcome problems of mechanical injury, heat, moisture and chemical action has been a vital part of our business for 67 years. That's why, today, KW Railroad Cables offer you *proved dependability* for systems that must protect property and life.

Portable Cord that gives you three times longer life than the average of molded cords of other makes. It's *proved* by 12,000 tests over a 3-year period.

Portable Cable: "It's the toughest, most flexible trailing cable we've ever used in our mines," says general superintendent of coal mining company.

Control Cable, backed by 67 years of experience in electrical wire and cable manufacturing. That means dependability—*proved security* for public safety!

Service Entrance Cable, now UL-approved for 75° wet applications! Improved design characteristics include pleasing appearance and ease of application.

IF IT CARRIES CURRENT

KAISER® KW WIRE CARRIES IT!

Now! Unsurpassed benefits for the railroad industry due to Kaiser Aluminum's recent purchase of the Wire and Cable Division of U. S. Rubber, located at Bristol, Rhode Island!

Now from one source, you get all the established KW products plus all products of the new Bristol mill (formerly Wire and Cable Division of U.S. Rubber). For former U.S. Rubber products, the same quality insulations and product guarantee terms will be continued.

Now from one source, you get the most advanced technical assistance in the industry—the full cooperation of the research and development leaders of both aluminum and copper conductors.

Now from one source, better-than-ever service—from two plant locations (Newark, Ohio and Bristol, Rhode Island). This includes service from the production, engineering, sales and distributor organizations of both Kaiser Wire and the former Wire and Cable Division of U.S. Rubber.

For immediate attention to any request for electrical conductor products, engineering and research service, or further information, contact your nearest Kaiser Aluminum sales office or the KW distributor listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Building, Oakland 12, California; *General Sales Office,* Palmolive Building, Chicago 11, Illinois.

Kaiser Aluminum

the bright star of metals

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

ACSR that can meet or exceed your toughest requirements. Put Kaiser Aluminum's growing leadership in extra high-voltage research to work for you today!

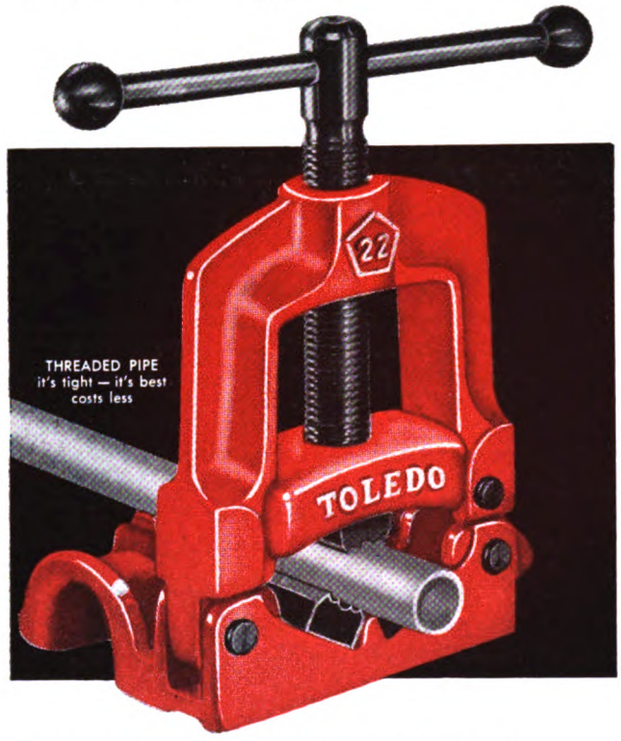
Triplex—combining three wires in one compact assembly—makes possible neater services, fewer attachments, easier installations—for big savings.

Power Cable that eliminated 26 competitive cables in time periods of from zero to 2,509 hours of a High Ozone Attack test—then went on to 6,000 hours.

Weatherproof—One of the nation's leaders in covered conductor, Kaiser Aluminum supplies the finest distribution, secondary and service cable in the field.

NEW TOLEDO No. 22 PIPE VISE

1/8" to 2 1/2" CAPACITY



TOLEDO QUALITY
COMPETITIVELY PRICED

Something new in quality, low cost pipe vises. Look at these TOLEDO *Quality Checked* features

- Strong, sturdy frame—but the No. 22 weighs only 12 lbs.
- Large diameter Acme vise screw threads for longer service—and they bear directly on upper jaw
- Yoke mounts quickly for right or left hand use
- Hardened steel, interchangeable jaws designed for most effective grip regardless of pipe or conduit size—⅛ to 2½"
- Large bolting area—contact points evenly distributed for secure attachment of vise
- Also available soon in ⅛ to 4½" capacity

Send for new catalog. Watch for TOLEDO'S new vise stand with integral yoke or chain vise.

Quality Checked

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO®

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

THE TOLEDO PIPE THREADING MACHINE CO., TOLEDO 4, OHIO

America's foremost engineered lettering tools

designed to reduce your present costs **50 to 80%**

Used today by 1/3rd of the Nation's leading Railroads . .

DN

Spray it®— **STENCILS**

PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

THE DEMP·NOCK COMPANY

21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.

DEMP NOCK®

A Cut Above Average

A. Taper Bridge Reamer (Straight Flute)

B. Taper Bridge Reamer (Spiral Flute)

C. Car Reamer (Straight Flute)

High grade small tools perfected through years of specialization.

BRIDGE REAMERS
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LOCOMOTIVE REAMERS
HAND REAMERS
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CHUCKING REAMERS
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PIN REAMERS
DRILLS
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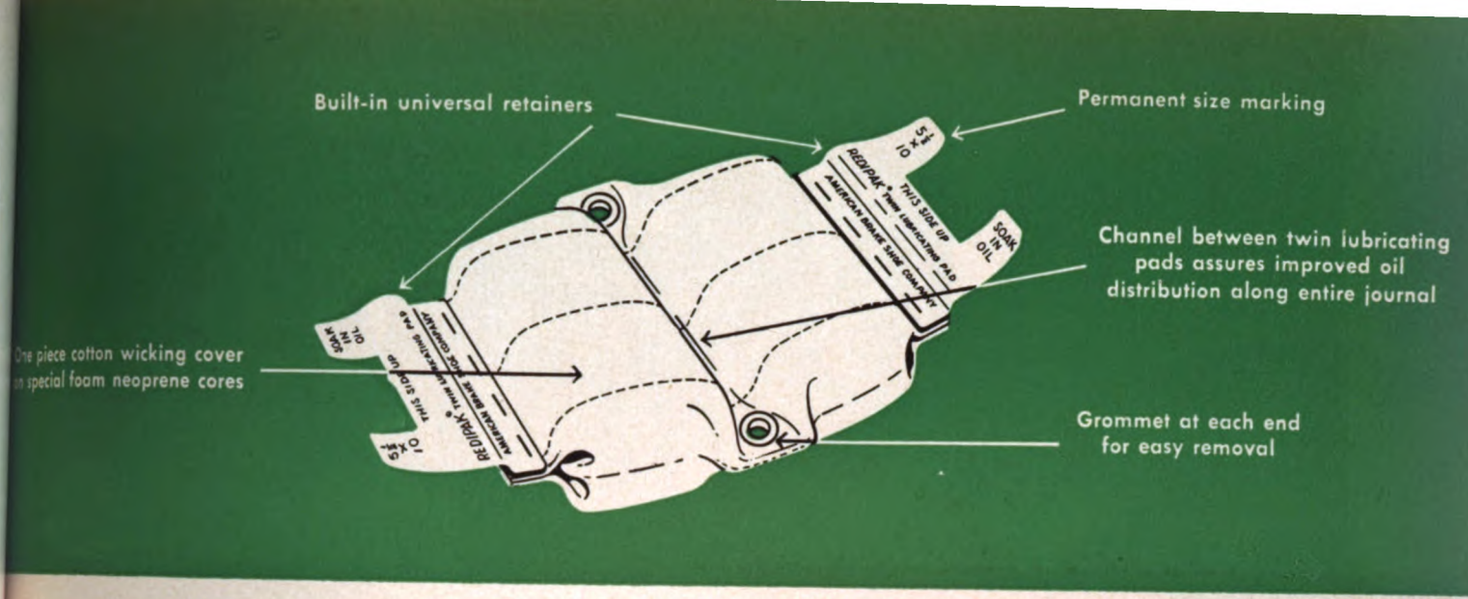
SPECIAL REAMERS

WAYNE TOOL CO.
Waynesboro, Pa.

SMALL W TOOLS



Redipak Twin = Positive Lubrication

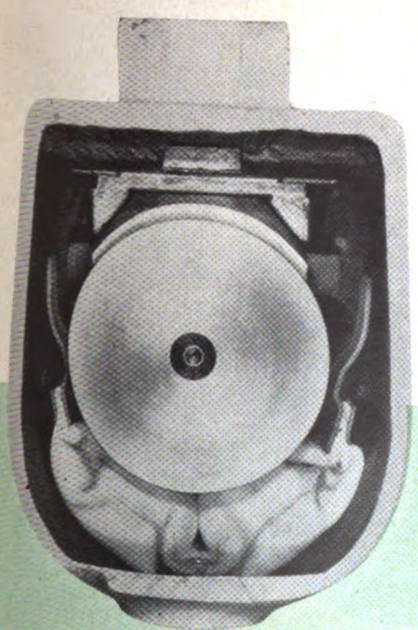
Redipak® Twin lubricating pads feature built-in universal retainers... fit all standard freight car journal boxes

Positive Shift Prevention! Built-in fibre retainers prevent both endwise shift and shift from journal rotation. Pad resilience holds retainers against side of box, away from journal. One universal style for use in boxes with or without retaining ribs.

Far Better Wicking Action! New heavier cotton weave provides superior wicking action. Cover is woven as a single tube, eliminating all possible seams from the wicking path. The twin design also provides for equalization of the oil level in the journal box through a channel at the center.

Improved Resilience! Twin inserts are made of specially molded foam neoprene, compounded to our specifications. This provides excellent set resistance and oil absorption properties, and is designed for improved resilience.

Superior Oil Distribution! New twin design assures improved oil distribution along the entire length of the journal.



Service on Leading Railroads Proves that

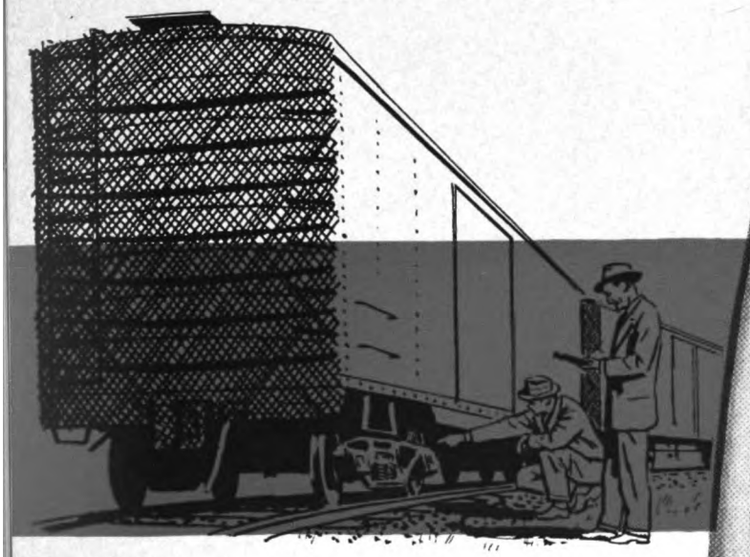
REDIPAK® PADS REALLY LUBRICATE!

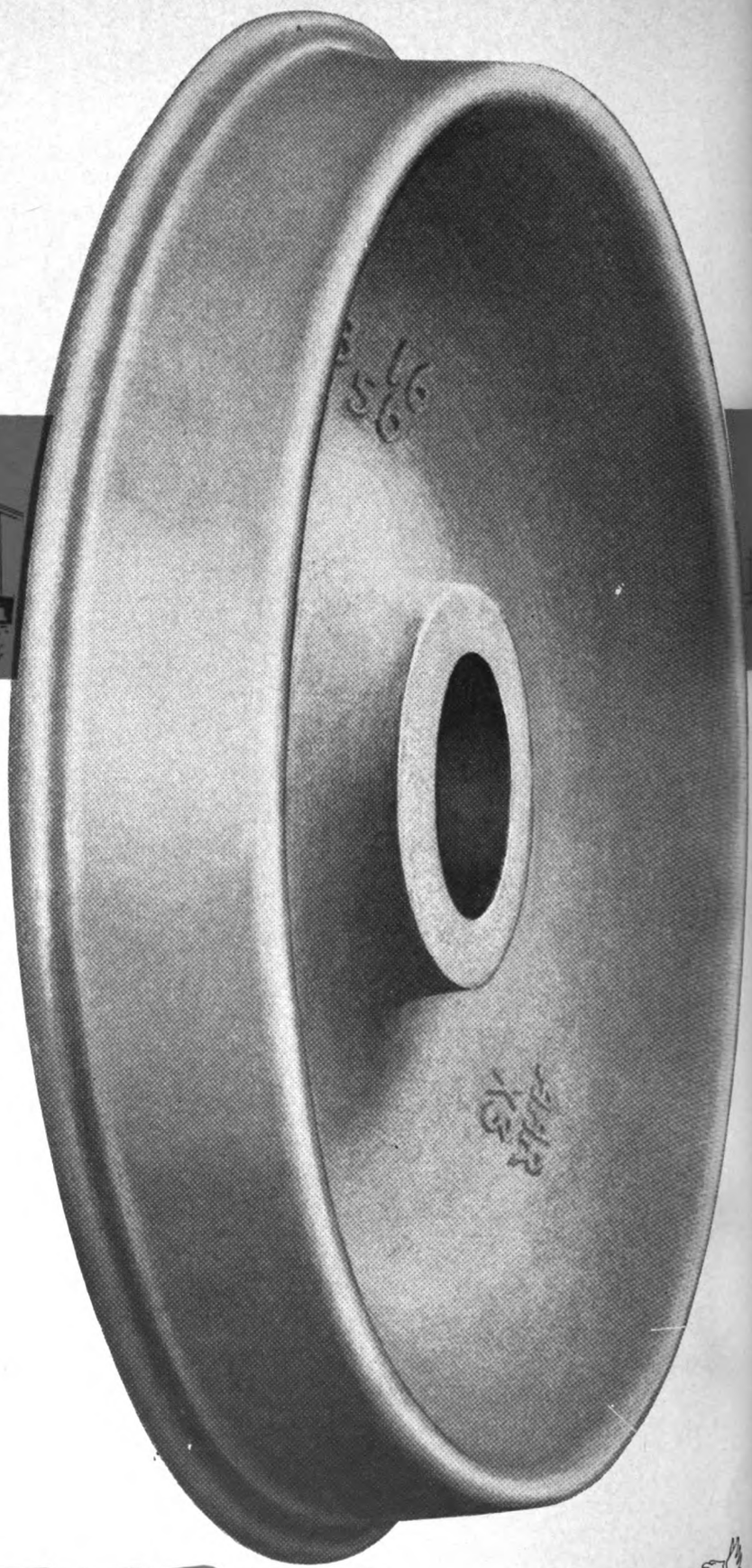
See How Much Oil Redipak Pads Soak Up!

SIZE	WEIGHT	
	Dry	Saturated
4¼ x 8	1 lb. 5 oz.	3 lb.
5 x 9	1 lb. 10 oz.	4 lb.
5½ x 10	1 lb. 15 oz.	5 lb.
6 x 11	2 lb. 6 oz.	6 lb.
6½ x 12	2 lb. 12 oz.	7 lb.

AMERICAN Brake Shoe COMPANY

RAILROAD PRODUCTS DIVISION 230 Park Avenue • New York 17, New York





1953 to 1956

Griffin EQS is placed in service under all types of cars and performance is so outstanding that the railroads move to adopt it as standard.

GEARED TO PROGRESS
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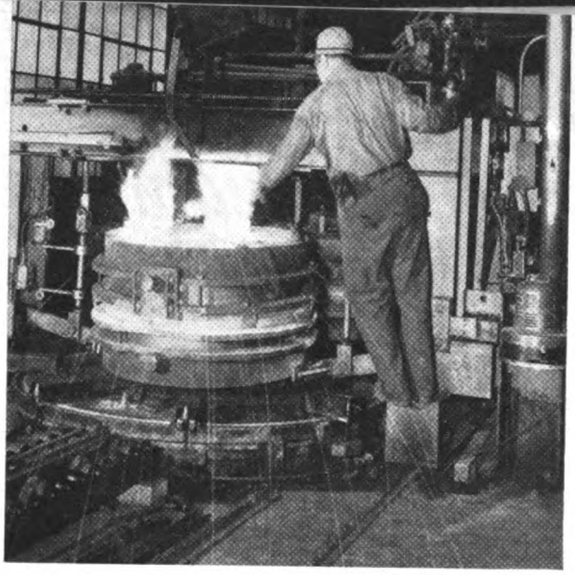
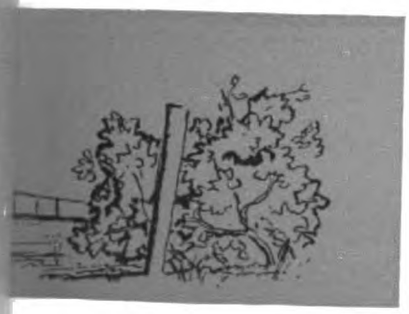
GRIFFIN EQS

ELECTRIC QUALITY STEEL

Griffin Wheel Company
445 N. Sacramento Blvd., Chicago 12
In Canada: GRIFFIN STEEL FOUNDRIES, LTD., St. Hyacinthe, Quebec
Plants strategically located to serve all railroads





1952

Griffin announces an entirely new concept of producing freight car wheels . . . a steel wheel, pressure-poured in precision graphite molds to fine tolerances.

1957

Griffin EQS...now approved as

AAR STANDARD

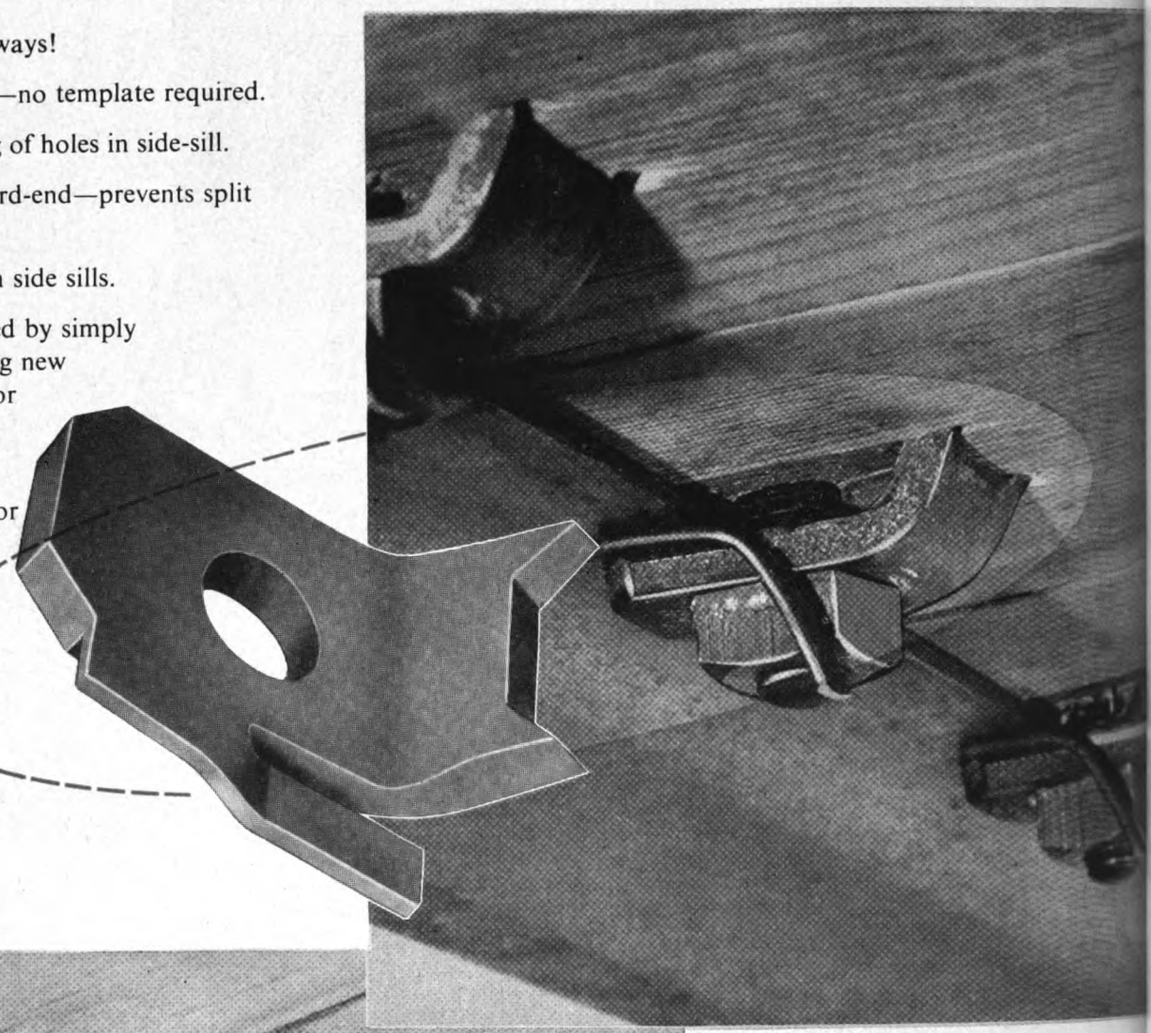
Effective March 1, 1957

Give the "green" to ***GRIFFIN*** *and watch your costs go down!*

M-F Floor Clips are the greatest single cost-saver in floor maintenance!"

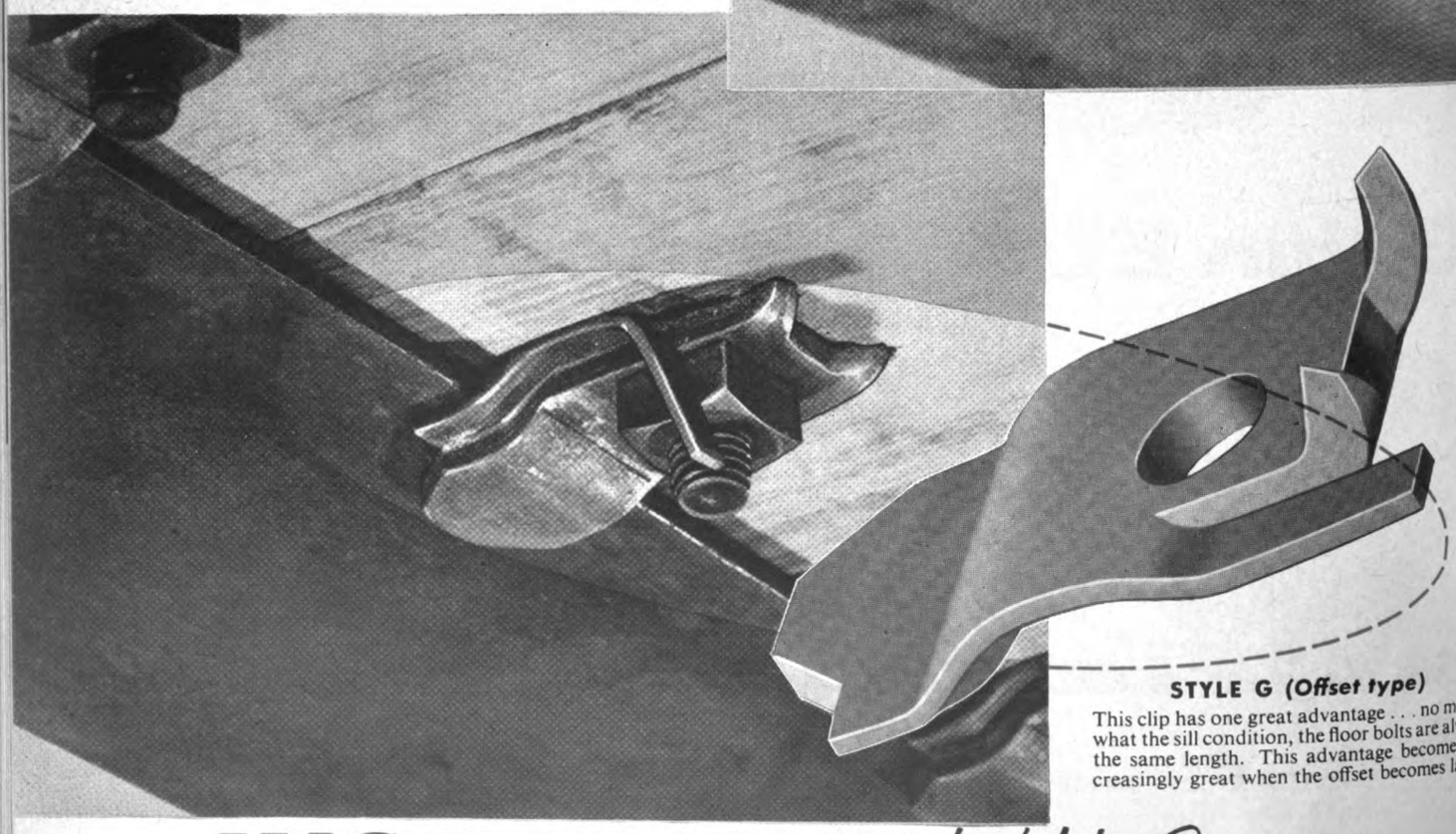
M-F Floor Clips save *6* ways!

1. Drill holes from above—no template required.
2. No punching or drilling of holes in side-sill.
3. Holes farther from board-end—prevents split boards.
4. No lining up holes with side sills.
5. Shrunken floors repaired by simply jacking tight and adding new boards—no new bolts or holes needed!
6. Bolt always applied on center line—no tipped or warped boards.



STYLE F *(Bridge type)*

Style F Clip will clamp the sill more tightly because the bolt is closer to the sill. It can also absorb variation in offset better than Style G.



STYLE G *(Offset type)*

This clip has one great advantage . . . no matter what the sill condition, the floor bolts are always the same length. This advantage becomes increasingly great when the offset becomes large.

MAC LEAN-FOGG *Lock Nut Company*

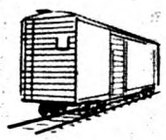
5535 NORTH WOLCOTT AVENUE, CHICAGO 40, ILLINOIS *In Canada:* THE HOLDEN CO., LTD., MONTREAL

LOCK NUTS • WATERTIGHT BOLTS • SPECIAL BOLTS • FLOOR CLIPS • LADI NG STRAP ANCHORS • STANDARD NUTS • THE M-F UNI-TORQUE LOCK NUT

SAVINGS FACTS:

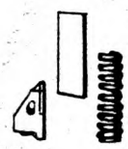
FACT No. 1

Barber Stabilized Trucks save maintenance costs. When it's necessary to service *Barber* parts, the friction castings and side springs are removed and replaced *5 to 10 times faster* than those of any competitive truck.



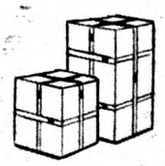
FACT No. 2

Barber Stabilized Trucks protect your equipment. Their unique system of suspension absorbs and eases . . . by friction . . . the destructive vertical shocks and bouncing as well as the lateral forces which usually result in dangerous nosing and swivelling.



FACT No. 3

Simplicity and durability in action! Barber's three sturdy parts . . . the special *friction shoe*, the *wear plate* and the *side spring* . . . can be inspected at a quick glance. Fewest possible working parts require less attention, do a better job.



FACT No. 4

Barber Stabilized Trucks save on damage claims. They provide *the* smoother ride for ladings. Simply stated, Barber Stabilized Trucks provide variable friction for variable loads. No over-solid spring blows! For smoother-riding freight cars, insist on Barber.

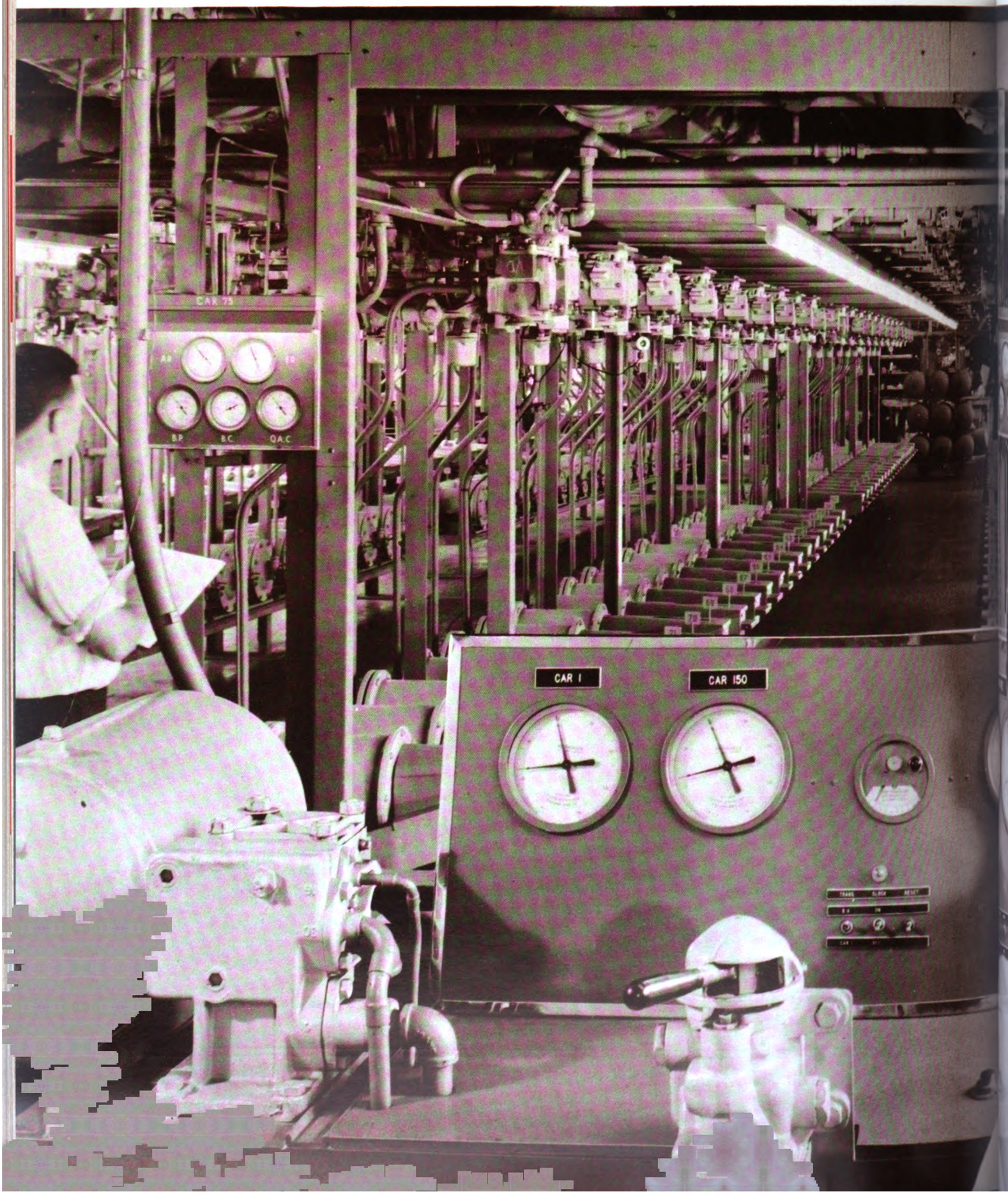
Specify Smoother-Riding

BARBER

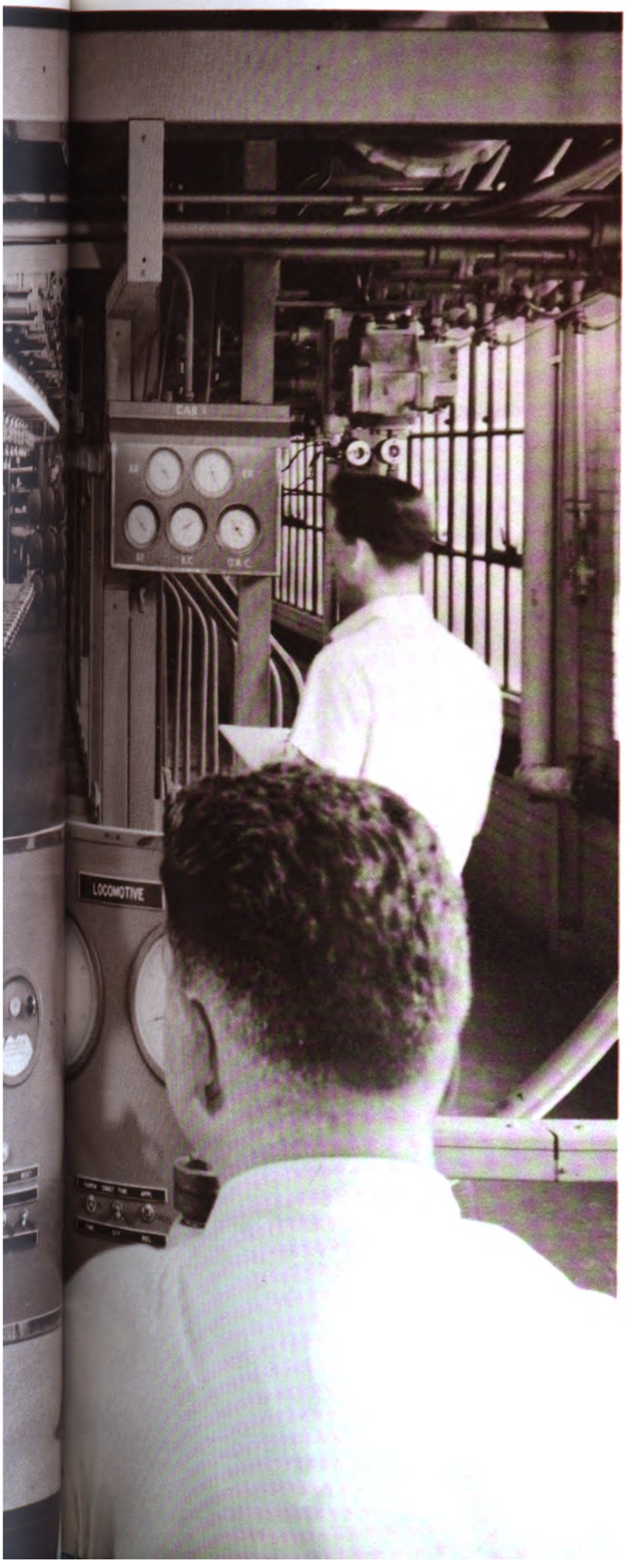
Stabilized Trucks

Standard Car Truck Company
332 S. Michigan Ave., Chicago 4, Illinois
In Canada
Consolidated Equipment Co., Ltd., Montreal 2

This experienced railroader



ɔade taught us something



HE CAME TO WILMERDING for a few weeks last fall, fresh from railroad service, to take part in Westinghouse Air Brake Company's Clinic for Supervisory Personnel. In the process we *both* learned, from each other.

He gained a more complete knowledge of the design and operation of air brakes and other pneumatic railroad equipment. He went back to his job—perhaps on your railroad—better equipped to cope with air brake operating and maintenance problems.

We, in turn, learned from him some of the new problems that are encountered. And we were reminded of some of the old problems and their solutions. We learned more about the part air brakes play in your operations and the part we can play in improving them.

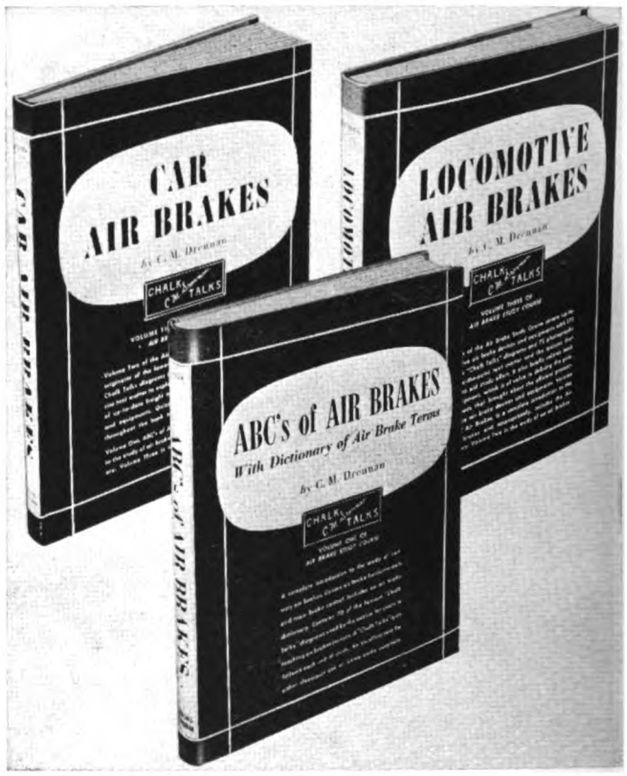
This exchange of ideas and information takes place every time a Westinghouse Air Brake man and a railroad man get together. The results are measurable in greater safety and faster scheduling through improved operation. That's why we like to get together often with railroad men.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

Test Rack used in Air Brake Research

3-Vol. Complete Air Brake Course

for apprentice classes or individual study



Written by C. M. Drennan, famed air brake teacher formerly with Westinghouse, these books utilize Mr. Drennan's tested and effective "Chalk Talks" method consisting of clear, simplified "blackboard" drawings that make the function of every part easily understood. Many photographs of equipment are also included. Interspersed throughout all three volumes are quizzes for review and testing of the student's progress.

Vol. 1 (ABC's of Air Brakes) covers friction and braking ratio and freight and passenger train brake control; function and operation of pistons, valves, electric controls and other components. Dictionary of words and terms used in air brake work.

Vol. 2 (Car Air Brakes) covers all car air brake valves and other devices; freight car brakes—AB, ABLC and AC. Passenger car brakes—D-22-P; electro-pneumatic; speed-governor control; Decelostat equipment; universal control.

Vol. 3 (Locomotive Air Brakes) is a thorough exposition of all locomotive brake equipments. Covers air compressors, relay valves and miscellaneous devices. ET equipments and modifications and 24-RL equipment; equipments with electric controls; braking force control.

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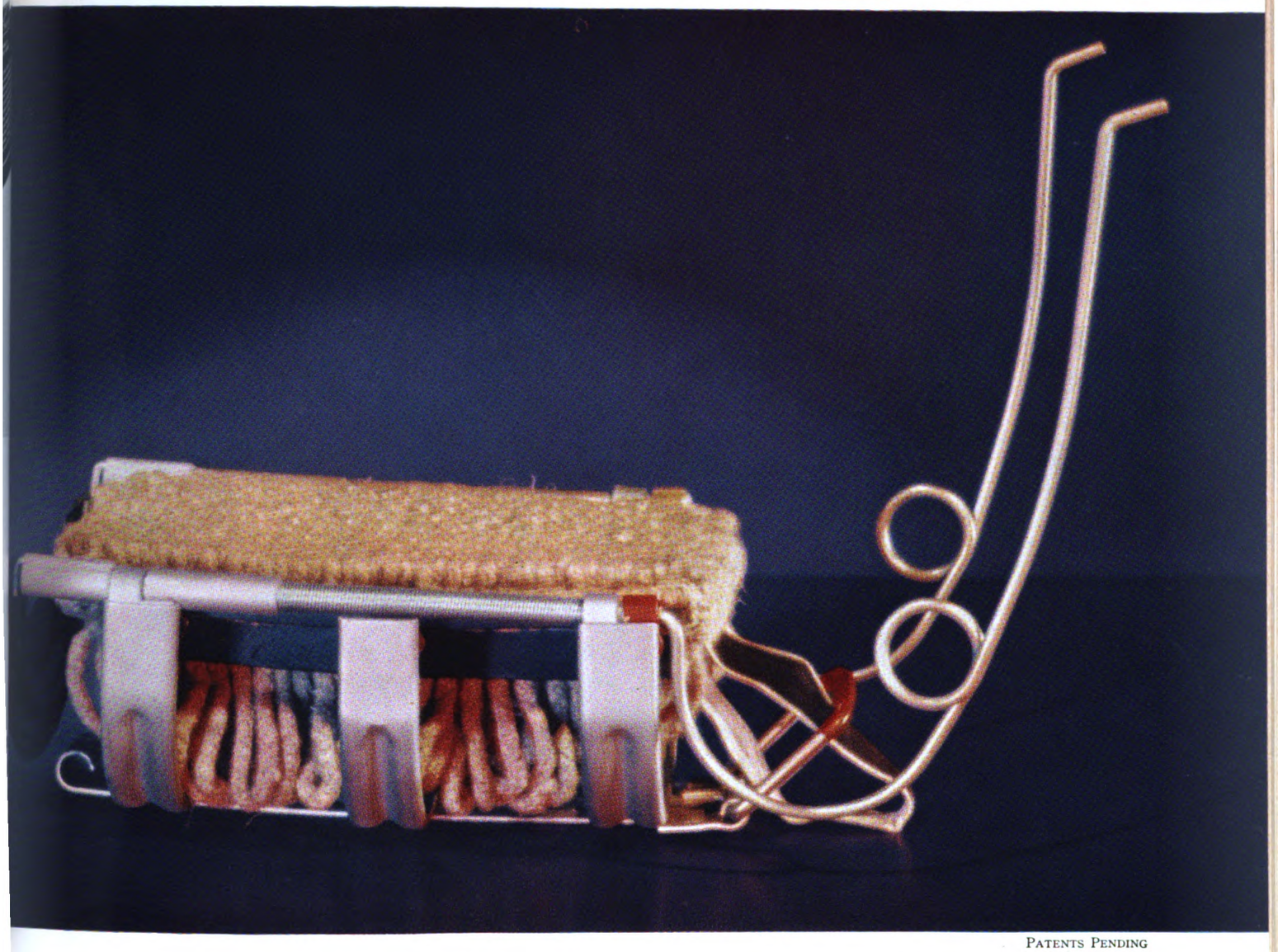
THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

ROLIN



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

THE rolin CORPORATION

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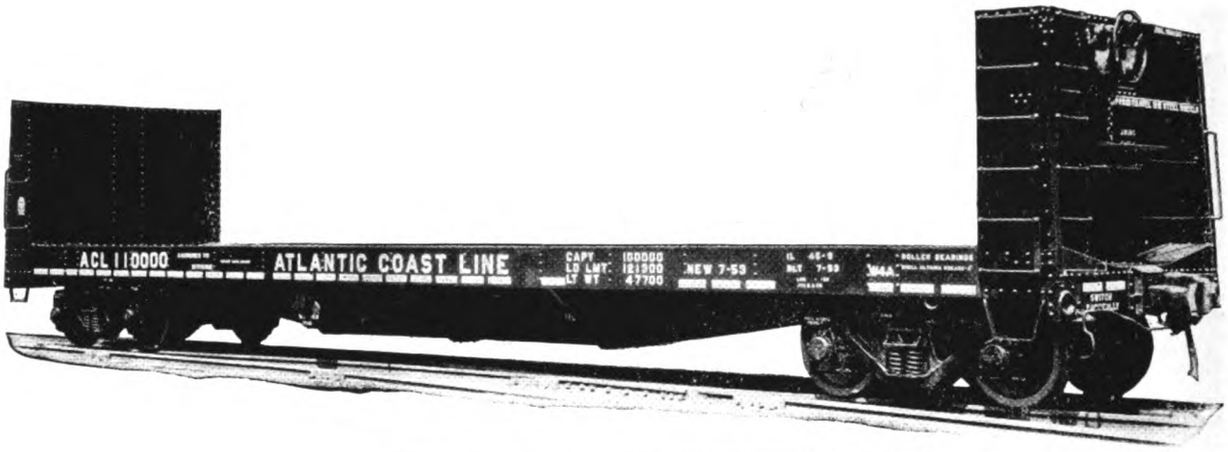


Three More with Multiple-Wear Wheels

Illustrated here are three modern types of Bethlehem cars that have been placed in service by prominent Eastern railroads. Each incorporates many advances in car design and construction. And each of them is equipped with multiple-wear Bethlehem wrought-steel wheels instead of the conventional one-wear type.

Of late years, the trend to the multiple-wear freight wheel has been very marked. More and more customers have been specifying multiple-wears on their Bethlehem-built cars. Today the demand is greater than ever, for excellent reasons.

Use of the multiple-wear wheel is a matter of simple economics. Because of its added thickness of rim, the multiple-wear can be turned when required and reinstalled. Thus this type of wheel is usually good for the life of the car.

We suggest you talk with us when you are next considering multiple-wear wrought-steel wheels. There are no finer ones made than those produced by Bethlehem. They are a long step in the direction of freight car economy.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

FREIGHT • PASSENGER • DIESEL

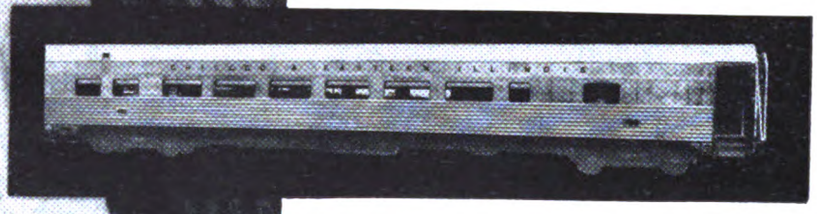
THE NEW LOOK

costs less...

HELIARC spot-welding and fusion welding are helping railroads save up to 88% of new rolling stock cost, by simplifying and speeding many car fabricating jobs . . . Now, using HELIARC welding, railroads can do more car work in their own shops, and realize substantial savings. Here are some important HELIARC welding features.

With HELIARC spot-welding, welds can be made with access to the work from only one side. All welds are clean and sound, and take only seconds to complete. No special skill is required.

HELIARC fusion welding can attain speeds of 100-in. per minute in many operations. This process makes top-quality welds in all types of joints, and in all commercially fabricated metals. It is the most efficient fabricating method for a wide variety of jobs.



Learn how HELIARC welding can speed production and help you save time and money . . . Contact your local LINDE Representative today.

A new stainless steel window frame is HELIARC welded in place . . . Ten additional passenger cars were remodeled at only 12% of new car cost.

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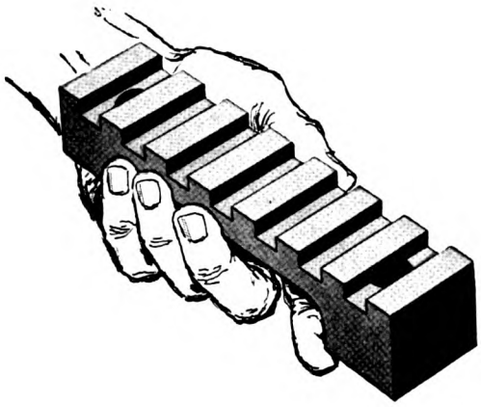
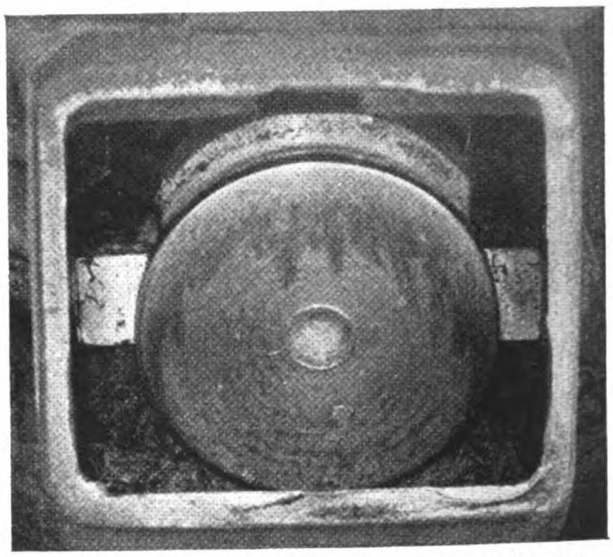
Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol - - -

Improve the efficiency of any journal lubricator with Magnus R-S JOURNAL STOPS





Here's proof of Journal Stops' unique ability to hold packing in place even under extreme service conditions. This unretouched photograph shows the interior of a Journal-Stop-equipped box after undergoing an 11½ mph flat-switching impact test. Waste is still firmly seated under the journal.

Longer bearing life and lower maintenance costs for trucks and journal boxes also yield big return on initial R-S Journal Stop investment

WITH conventional waste packing and Magnus R-S Journal Stops, you can run freight cars for *three years* between periodic servicing. That's been established by test experience to date.

Bolted to both sides of the journal box, the bronze bearing-metal Journal Stops form a permanent, built-in waste "container" that holds the mass of packing right where it belongs, even under severe braking and impact forces. And, unlike any other waste container or retainer, by keeping the bearing on the journal, you prevent short strands from being trapped beneath the bearing crown. By restricting fore-and-aft movement of the journal within the box, they prevent squashed-down waste packs, maintain constant journal-to-packing pressures, assure a uniform feed of oil to the bearing and *eliminate danger of waste grabs.*

But that's not all. You also get longer bearing life and freedom from spread linings. You reduce the requirements for an effective box rear seal and increase the efficiency and service life of present dust guards and seals. That's vital to the successful operation of most waste substitutes.

Pad and mechanical lubricators benefit too. By keeping the journal in its proper position, you keep the box from rising during impacts and braking — don't crush the lubricator or seal. Axle dust guard seats can't be scored either.

WHAT ABOUT COST? One private car line estimates it has recovered more than 90% of the total cost of Stops and installation in just the first 20 months of operation. Other roads report comparable savings. R-S Journal Stops not only pay for themselves in reduced maintenance costs. They get cars to destination with trouble-free journal boxes. Write for complete information. Magnus Metal Corporation, 111 Broadway, New York 6 or 80 E. Jackson Blvd., Chicago 4.

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Solid Bearings

MAGNUS METAL CORPORATION

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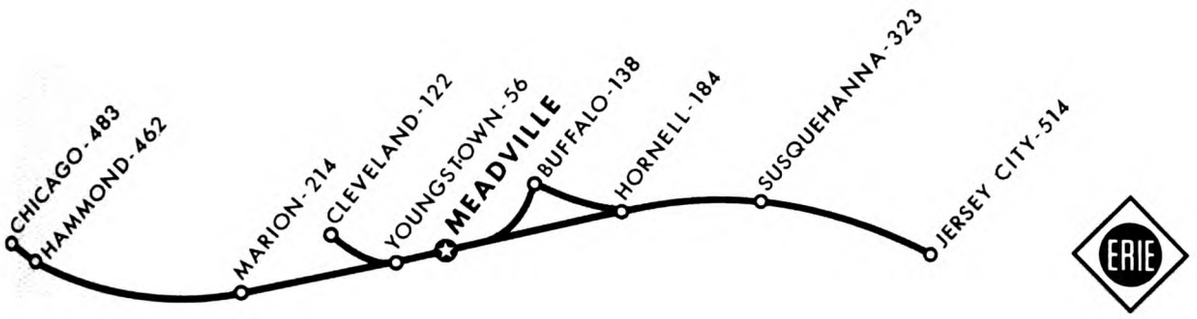


Simplified main line map shows mileages from Meadville. A division point and almost a mid-point of the system. Meadville now has a wheel shop. Under construction is a new freight car repair shop.

Erie Is Centralizing All Wheel Production

New machinery and materials-handling equipment are vital to the well-organized, high-capacity system wheel shop.

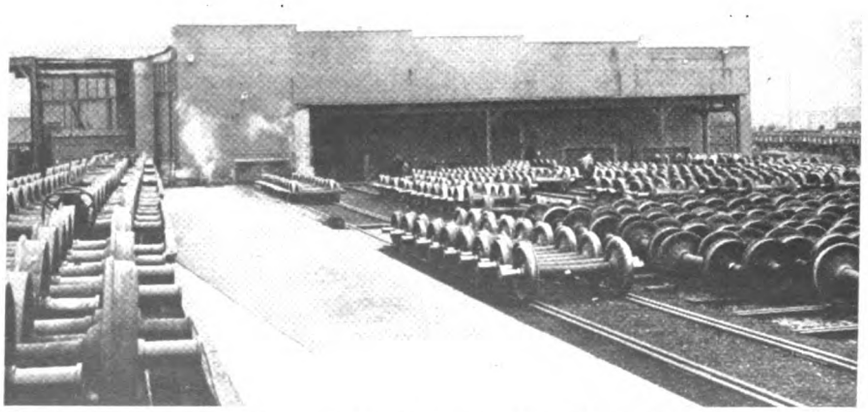
While the Erie Railroad began its centralized car wheel production at Meadville, Pa., ten years ago, today's shop has changed greatly from the facility that went into operation in 1947. The Erie was a pioneer in consolidation of wheel shop facilities, and from the begining equipped the shop for a high degree of semi-automatic production. Even with all this, the Erie has poured well over a quarter-million dollars into the Meadville shop in the past five years. This was a shop that already could have been cited for the completeness of its facilities and its production rate.

A Sellers dual end-drive journal lathe installed in 1954 permitted elimination of eleven lathes all along the Erie from Hammond, Ind., to Jersey City. Many of these were general-purpose engine lathes, but most had been retained only for journal refinishing. The Sellers profiling contour tread-truing lathe installed in 1955 released three older tread lathes at system car shops. The only tread lathes now operated on the Erie—other than at Meadville—are machines used for emergency work at the locomotive shops at Hornell, N. Y., and Marion, Ohio.

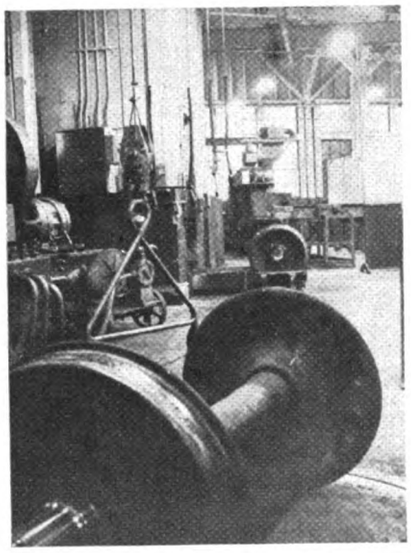
It was in 1947 that the Erie transferred its car wheel production from Hornell to Meadville. The wheel shop was set up in a section of the old roundhouse, and was designed to produce 65 new wheel sets per 8-hr day. To accomplish this, intensive use was made of automatic conveyors and remotely-controlled devices for the handling of both wheels and axles.

Continuing Improvements

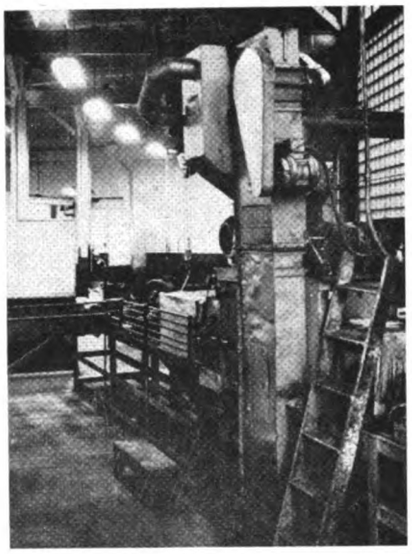
Since then the Erie has pursued a systematic machinery replacement program, and has improved its materials-handling facilities. This shop has produced 2,600 reconditioned wheel sets in a single month. It has



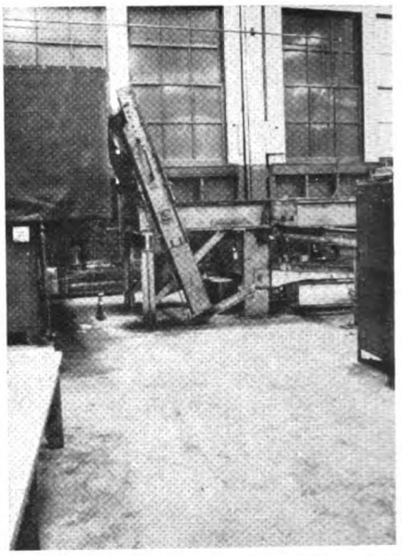
Meadville shop does all Erie's car wheel work—turning of journals, turning of treads, and production of new mounted pairs both for freight and passenger cars.



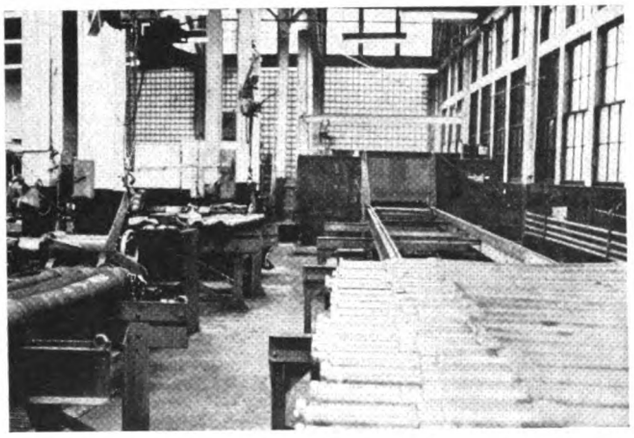
Stripping press (left) and wheel elevator (center) remove and dispose of scrap wheels. Axles then go on for inspection and reuse if suitable.



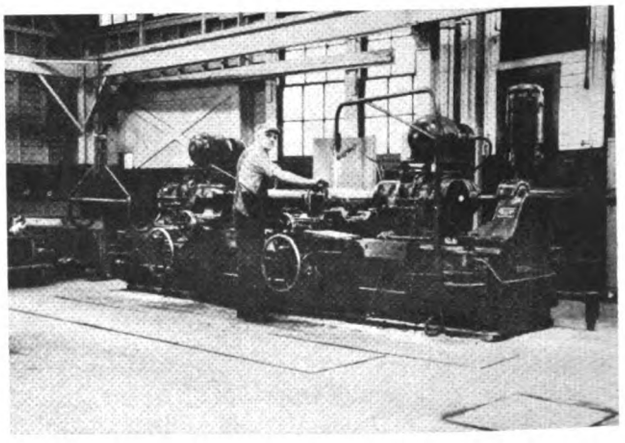
Axle cleaner was built from Wheelabrator flue cleaner and uses metal pellets to prepare the axle surfaces for Magnaglo inspection.



Magnaglo inspection (left) is followed by classification at entrance to storage rack. Sorting can be by size or to set out the rejects.



Axle lathes (left) have individual storage racks and jib cranes with electric hoists to handle the axles at racks and in and out of the machines for turning.



Newest axle lathe is a Sellers end-drive machine which can swing mounted wheels and can serve as a standby for the new high-production journal lathe.

turned 100 cut journals in a single day. There is the capacity to bore and mount 90 pairs of new wheels in one 8-hr shift; but this production rate would require round-the-clock operation of all three axle lathes because each can turn out only about ten axles per shift.

The new Sellers profiling lathe has been averaging 13 wheel sets each working day (8 hrs), but has done 15 when the occasion demanded. This has been accomplished while working wheel sets just in the order they were delivered to the shop. Such a procedure requires more set-up time than when wheel sets of one size and type can be run. The Erie has recently been working this machine with Kennametal disposable carbide tool inserts. It is anticipated that the use of these throw-away tool tips will make it possible to do tread work on up to 20 wheel sets per shift.

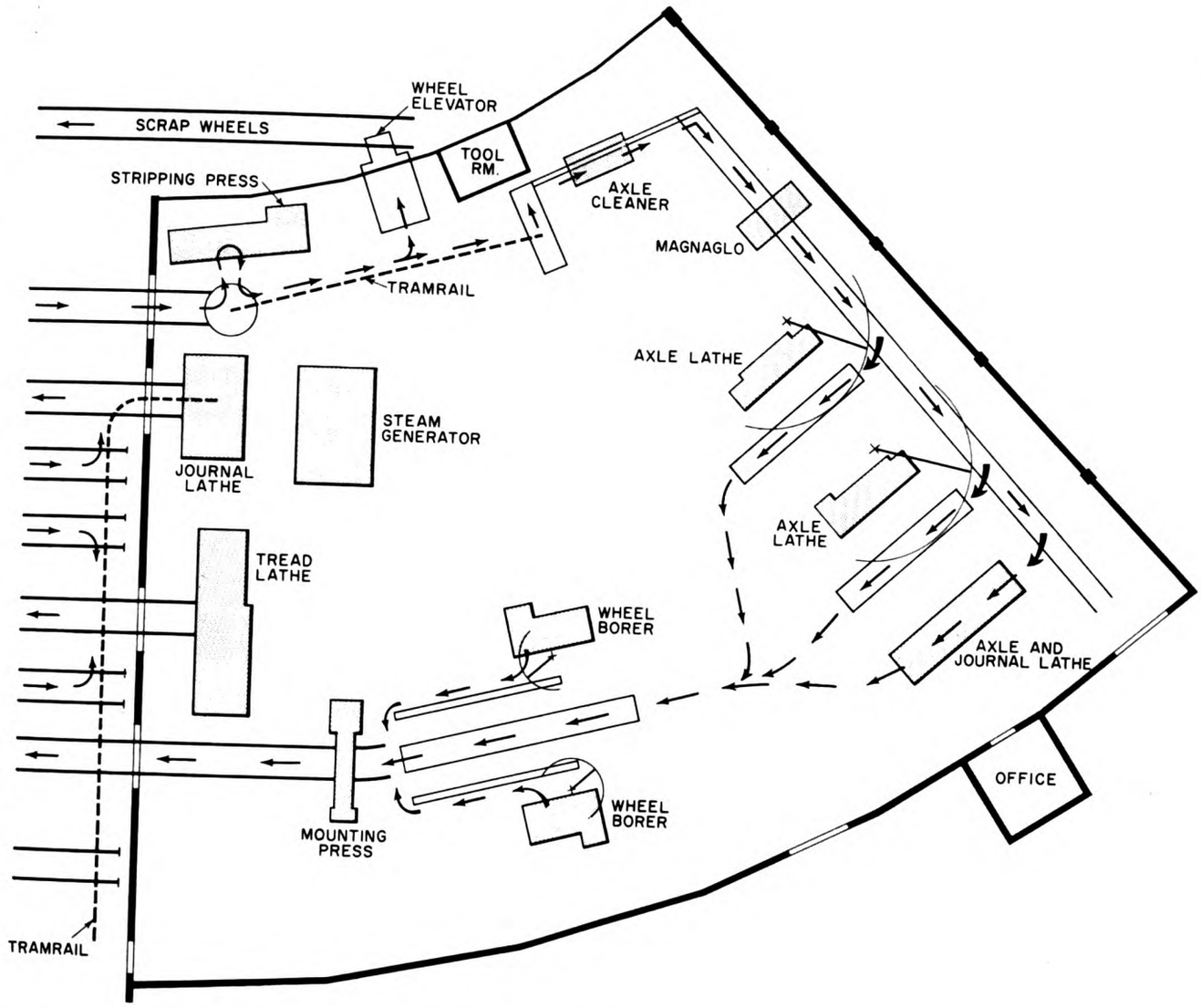
System-Wide Transportation

Increasing the production potential is important because Meadville is not only doing all the Erie's car wheels now, but nearly all the locomotive wheel work, as well. A shop adjacent to the main wheel shop at Meadville produces the Erie's new diesel wheel sets, and has facilities for inspection of traction and Spicer drive gears, and locomotive and passenger car roller bearings. Meadville does all of the routine tread and flange work on locomotive wheels, only emergency work is handled at Marion and Hornell.

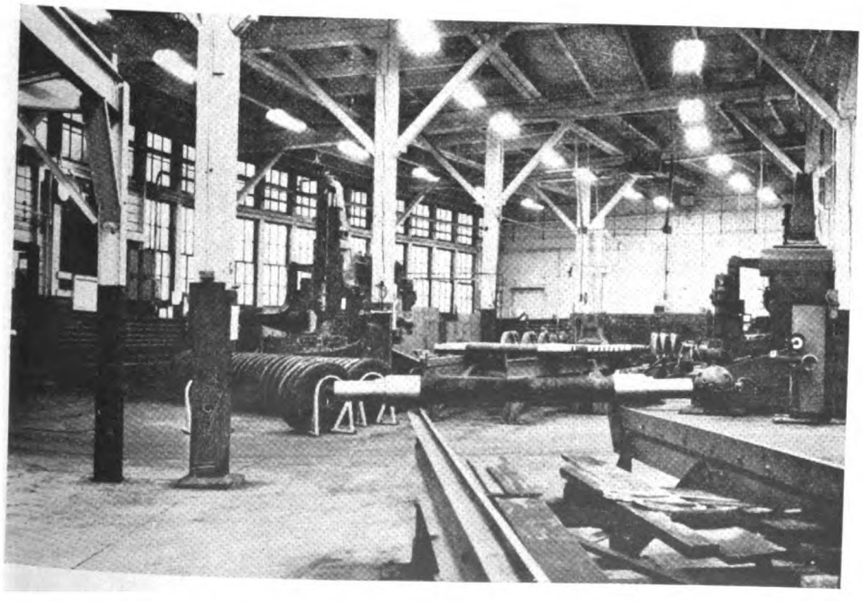
Moving all locomotives and car wheels to and from the central shop at Meadville requires 75 specially-equipped wheel cars. Erie's car-wheel cars will handle 21 wheel sets arranged in staggered style. The eight locomotive-wheel cars each hold ten wheel sets; two cars are assigned to each of the locomotive shops at Marion, Hornell, and Jersey City, and the other two cars supply smaller shops.

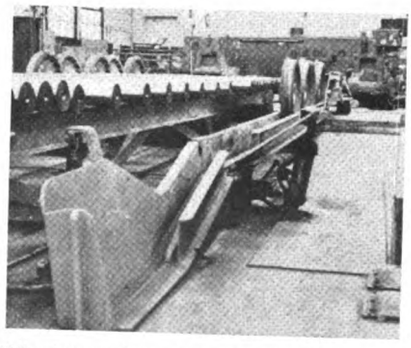
Meadville is a division point almost at the midpoint of the Erie's main line. Wheels can be moved in and out of this point rapidly; a minimum of company freight ton-miles is involved. Late this year the new Erie freight car shop will be opened

(Continued on page 46)



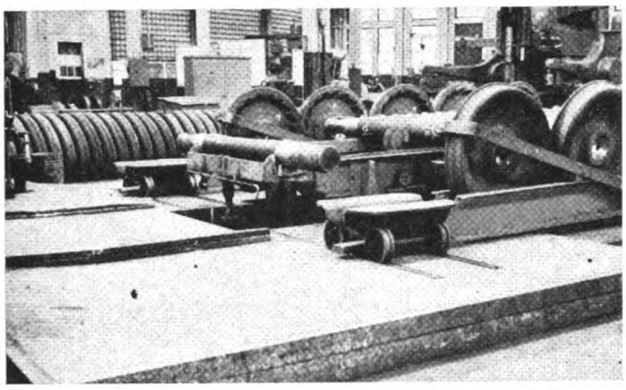
Reuse of axles requires removal of scrap wheels, cleaning, inspection, turning, machining of new wheels, and finally assembly and mounting of wheel set. This process is built around three sides of section of the former Meadville roundhouse which is now the system wheel shop.



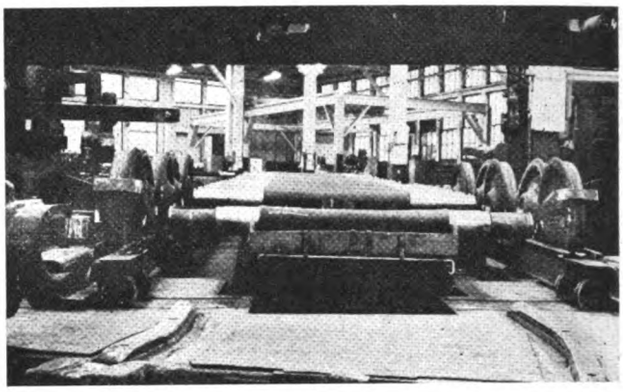


Wheel from Betts borer is placed on apron in foreground where it is brought to final vertical position and then fed to conveyor trough.

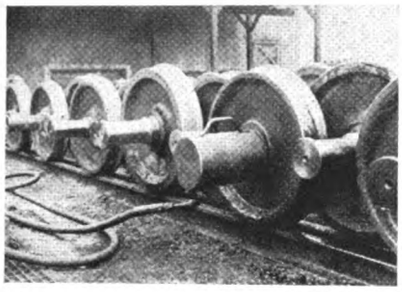
Turned and burnished axles are moved from axle lathes to the wheel press rack by lift truck. Shop is fluorescent-lighted throughout.



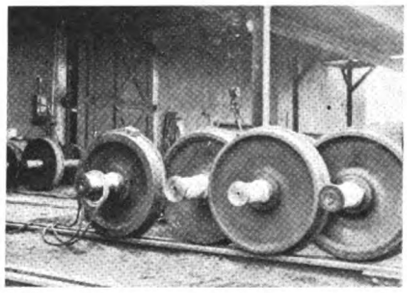
Single axle and one wheel on each side are fed to assembly position with mechanical trip mechanisms. Small cars move the wheels over axle ends.



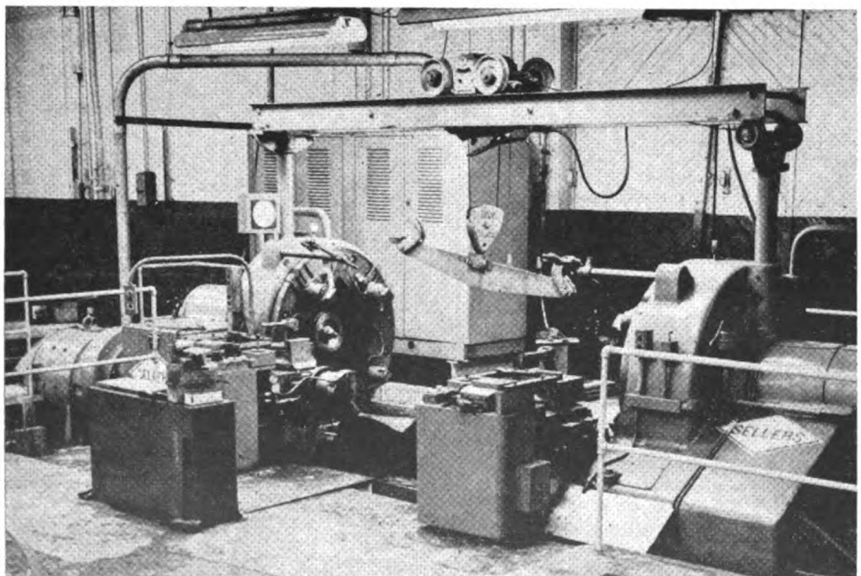
Wheel press (foreground) is last stop in operation occupying most shop floor space. Despite building shape handicap, smooth flow has been achieved.



Steam coil inside metal hood softens protective compound so journal can be cleaned prior to going into the shop.



Magnaflux leads and control cable are long enough to be used in wheel storage yard in front of the shop.



Profiling tread lathe was installed last year; was final step in bringing all car wheels to Meadville. It eliminated three tread lathes at car shops.

(*Continued from page 2*)

in Meadville. This will mean a major reduction in the transportation involved in moving new and turned car wheel sets. Factors which led to the establishment of the wheel shop at Meadville also played a large part in the establishment of the new car shop at the same point.

The present freight and passenger car shop at Susquehanna, Pa., and the terminal at Jersey City sometimes send in solid carloads of passenger or freight car wheels. However, most loads of wheels are not sorted before shipment, but each wheel set is shipped with a tag indicating the AAR defect for which it was removed. All wheel sets are shipped to Meadville for disposition even though the line point has rated a wheel as suitable only for scrap. The final decision is made at the central wheel shop.

Loads of wheels are inspected upon arrival. Journals are usually coated with rust preventive prior to shipment to the shop. The Erie uses a number of portable steam-heated hoods which fit over the axle ends and soften the protective material to facilitate its removal. Wheel sets with cut journals and with wheels for turning have their journals Magnafluxed after the preliminary inspection and cleaning. This Magnafluxing is done with a portable unit which can be used while wheels are awaiting processing on outside storage tracks.

Shop Machinery

The Sellers dual end-drive journal lathe purchased in 1954 is capable of swinging 42-in. wheels and does most of the journal turning. However, a slightly older Sellers machine capable of swinging 36-in. wheels protects this machine and provides extra capacity while spending most of its time as an axle lathe.

The Sellers profiling contour tread truing lathe purchased just over a year ago is capable of handling both car and locomotive wheels. When tread and flange work is done, journals are always reworked at the same time on one of the journal lathes.

Most of the shop area is devoted to the reconditioning of old axles for new wheels, to the turning of new

axles, to the boring of new wheels, and finally to the assembly of the new wheel sets. These various functions are connected with a series of turntables, monorails, conveyors and storage racks.

A Chambersburg demounting press removes scrap wheels from the axles; the wheels are then moved from the shop to a scrap car through a wheel elevator. These axles then go to the axle cleaning machine where they are shop blasted with soft metal pellets. This cleaning machine is a converted Wheelabrator flue cleaner which the Erie rebuilt to do the axle job.

After the removal of dirt, grease and scale, axles with visible cracks are scrapped. Those remaining are measured to determine if refinishing is economically feasible. Axles which are suitable for reuse are then processed through a Magnaglo unit for final determination of surface defects. Axles can be turned in any one of three axle lathes. Two of these are center-drive Betts machines and the third is the Sellers end-drive journal lathe previously mentioned.

The two Betts car wheel borers are located on the two sides of the rack in which axles are delivered to the wheel press. An Erie-designed conveyor system moves the wheels into position at the ends of the axle at the Chambersburg mounting press. This machine is now scheduled for replacement and the new machine will incorporate all the equipment necessary for assembling locomotive wheel sets and mounting roller bearing races.

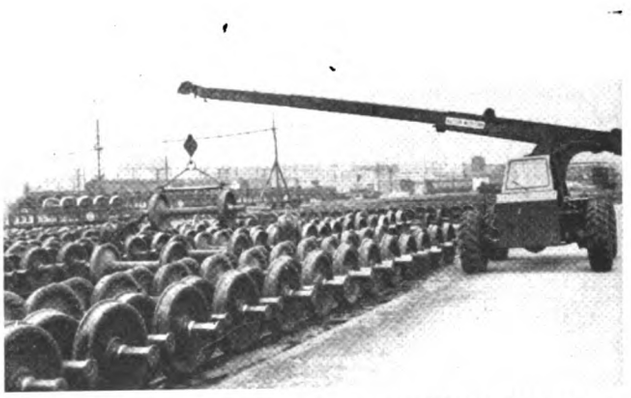
A fork lift truck handles wheels, axles and wheel sets around the shop. This truck moves both wheels and axles from stores stocks which are maintained along paved roadways which surround the wheel shop. Well over 90 per cent of the Erie's new freight car wheels are mounted on second-hand axles; a much higher proportion of new axles is used in assembling passenger car wheel sets. Loading and unloading of the wheel cars is done with an Austin-Western telescoping-boom hydraulic crane with a capacity of 5 tons. This truck has greatly speeded the classifying of wheels as they arrive on cars from line points. It makes possible rapid sorting of the wheel sets as to size and defect for which they were sent to the shop.

This shop is not only handling almost all of the Erie wheel work now, but is doing considerable work for other companies. There is locomotive wheel turning for nearby industrial plants which operate their own locomotives, and general wheel work for neighboring shorter railroads.

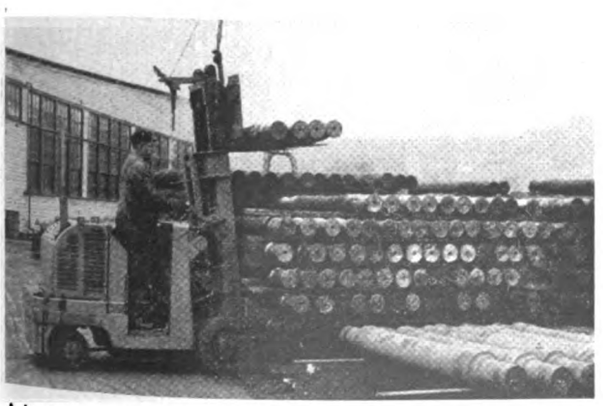
Procedures have been established, and equipment has been selected and arranged to do a big job. Today Meadville shop is doing it.

Materials Handling Is Vital To The Operation

Wheel sets are handled on and off wheel cars with Austin Western hydraulic crane truck.



Sorting of wheels on to several tracks is possible as crane removes wheel sets from cars.



Axle stocks are located around the wheel shop and are handled with fork lift truck.

Wheel handling is one-man job with special hand-operated retainer on Yale shop truck.

What Causes Gas-Turbine Road Failures?

By Ross C. Hill
Union Pacific Railroad

The 25 Union Pacific gas-turbine locomotives are assigned to freight service between Council Bluffs, Iowa, and Ogden, Utah. This run starts at 1,000 ft elevation at the Missouri River, climbs steadily for 500 miles across Nebraska to 6,000 ft elevation at Cheyenne. Thirty-nine miles west of Cheyenne, the line peaks at 8,000 ft elevation and then runs across Wyoming on a high rugged plateau, never dropping below 6,000 ft elevation. The last 65 miles of the route drop down Weber Canyon in Utah to Ogden at 4,300 ft elevation.

Weather conditions across the 1,000-mile territory vary from hot and humid to very dry and dusty. Ambient temperatures from —30 F to +100 F are not uncommon. Dust and sand storms driven by high winds occur regularly. In winter it is not unusual to run through a horizontal blizzard with little if any snow stopping on the ground.

The locomotive is subject to considerable vibration and shock from rail and drawbar effects. Surrounding air is contaminated with dirt from ballast and rail sanders. The low-grade residual fuel required for economical operation imposes additional difficulties in combustion and fuel handling and adds to control complications. Track profile and traffic conditions necessitate frequent load cycling between idle and full power. A large number of shutdowns and startups are required to conserve fuel.

The first of the Union Pacific's 25-gas-turbine-powered locomotives was delivered in February 1952. By the end of August 1956, one of the turbines had accumulated 17,704 fired hours, with the balance graduating down to a minimum of 7,332 hr. All of the 27 turbines, including two spares, have been out for modification and repair at least once.

Maintenance Problems

In the past four years, many maintenance problems have arisen. Some have been solved. Since a study of all the problems encountered would be too lengthy, a record of the defects occurring during August 1956, has been selected as representative. During that month each of the 25 operating turbines accumulated an average of 432 fired hours out of a possible 744 hrs.

During August there was a total of 22 reported defects with 14 locomotives involved. The defects can be classified as 15 control failures, five turbine-component mechanical failures, one case of wear, and one failure due to manufacturing error.

Gas-turbine performance records are being hurt by failure of auxiliary components which are not designed as well as the machine itself. Realizing that precise regulation is required in order to extract the utmost in efficiency from modern machines, the job is only half done when the precision control is not mechanically able to do its job satisfactorily.

Many of the control failures can be classed as nuisances as far as repair costs are concerned, but they are very serious from the standpoint of reliable operation and costs chargeable to delayed trains.

Attempts to dig deeper into the reason for locomotive failure are often very frustrating. In all too many cases, the defect is transient and there may be many cases before the answer is uncovered.

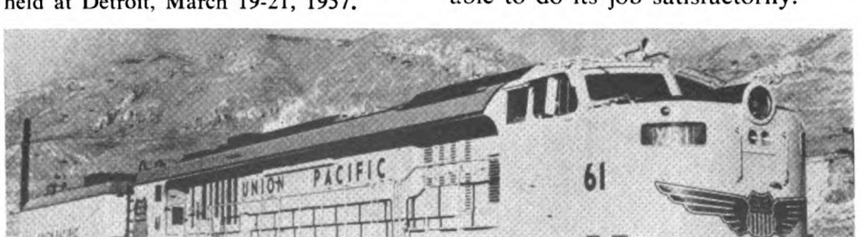
While it is indeed true that railroad inspection and maintenance practices are not overly elaborate, the majority of failures must be charged to the fact that control devices and auxiliary equipment designed primarily for stationary service usually lack the ruggedness and simplicity needed for railroad service.

In the trend toward automatic operation there is a tendency on the part of control designers to make control systems overly complicated. There is also a tendency to overcome faults in control devices by the addition of another device rather than correcting the basic fault.

To date, the Union Pacific has not accumulated sufficient gas-turbine experience to assign an estimated life to turbine components. During this development period there have been so many modifications that life data on most components are very clouded. There have been some spectacular improvements in individual items such as fuel nozzles and combustion chambers, but it is still to early to tell where developments will lead.

Blade erosion on the compressors is not fully pinned down at present, but the tentative pattern indicates that compressors will require reblading at about 15,000 hr under present conditions. Erosion conditions appear to be worse on the Wyoming Division, possibly due to the presence of fine cinders from coal-burning steam locomotives. One turbine which operated for 3,000 hr between Los Angeles and Las Vegas showed a much slower-than-average erosion rate even though operation was in desert territory with occasional sand storms. On this run there are no cinders

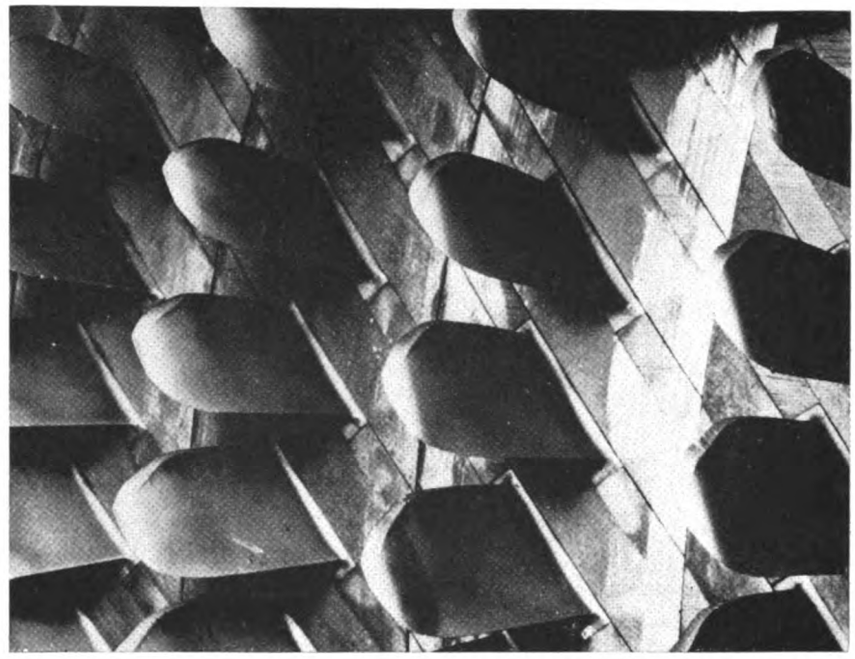
From a paper presented before the ASME Gas Turbine Power Conference held at Detroit, March 19-21, 1957.



Gas-turbine electrics on Union Pacific haul insulated tenders regularly. This increases lengths of runs without refueling. Units experienced 8.7 failures per 100,000 locomotive miles last August.

and no overhead coal chutes. Compressor air inlets are now on the roof of the locomotive with no filtering. This has eliminated blade fouling which occurred when air was taken inside the cab through viscous impingement-type filters. Blade erosion occurs at the tips of the rotor blades and at the roots of stator blades. This is fortunate since excessive centrifugal stresses do not occur as a result of wear.

The foregoing might leave the impression that gas turbines are too unreliable for locomotive power plants. A brief look at the performance record shows that the opposite is true. During the month of August, the active fleet of turbine locomotives averaged 12,026 miles each, which was considerably better than any other type of freight locomotive assigned to the same district. The turbines handled 18.2 per cent of the freight hauled on the Eastern District and 11.5 per cent of the freight on the entire Union Pacific. Records show that the turbine failures detailed here occurred at a rate of only 8.7 per 100,000 miles, which is not a bad record. These locomotives consistently move trains faster than other types of freight power, with the August average being 34.95 train miles per train hr. This is 6 mph faster than comparable diesel-electric units. This performance is very attractive to the Union Pacific in its constant effort to speed up freight movement. While failures cannot be ignored, they can be endured during the development of a power plant which excels in performance.



Blade erosion on gas turbine compressor rotors occurs at blade tips. Even though it is not fully understood, wear pattern does not increase centrifugal stresses.

THESE WERE LAST AUGUST'S GAS-TURBINE FAILURES

LOCOMOTIVE 51
One control failure

August 24: Turbine shut down for unexplained reason. Delayed two passenger trains and three freight trains. Turbine could have been restarted with little delay if it were not for a chronic secondary failure. Spark gap ignition plugs are not reliable under the adverse conditions of a Bunker C shutdown. They are not able to ignite the residual fuel and often become coated and ground out while fuel lines are being purged of heavy fuel. With a reliable ignition system, these failures could be relegated to nuisances.

LOCOMOTIVE 52
Two control failures

August 8: Lost 2 hr 10 min running time because the inlet temperature control cut the power due to a false indication. Inspection of the pneumatic temperature control system disclosed an air leak at a flared fitting. This failure is chargeable to the use of copper tubing and a flared connection at a point subject to high-frequency vibration.

August 8: Delay of 1 hr 30 min while getting a helper locomotive. Indication was the same as that of previous failure; but reason could not be found and trouble did not recur.

LOCOMOTIVE 54
Two control failures, one mechanical failure

August 8: Locomotive was charged with unscheduled shop time to change out a failed atomizing air compressor. This is a two-stage centrifugal compressor which boosts main-compressor discharge air approximately 2 to 1 for the air-atomizing fuel nozzles. It is driven by an extension from the turbine shaft. Impeller speed is approximately 52,500 rpm. The sleeve bearings on the impeller shafts have been judged to be marginal since the majority of compressor failures have come from failed bearings. Bearings and shaft seals have been redesigned to improve the condition. It has been necessary to apply large vents from the bearing housing to prevent pressurizing the lube-oil tank through the bearing drains. Prior to this modification, it was possible to blow all the oil out of the tank and fail the turbine bearings.

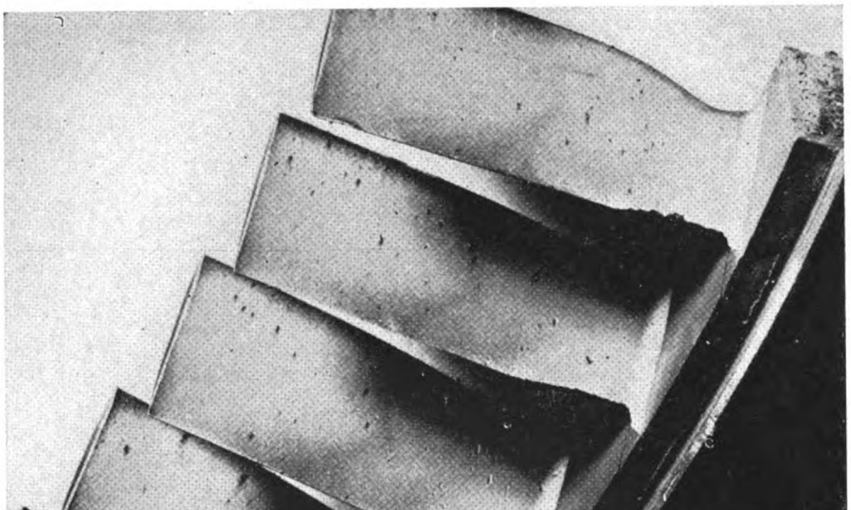
August 11: Locomotive lost 40 min running time because of low power. This was again traced to a broken copper tube at a flared connection.

August 24: Turbine died. It was necessary to get another locomotive because the turbine would not fire. Three trains were delayed. It was necessary for maintenance forces to make temporary repairs to high-voltage ignition-plug lead before the turbine could be started. Possible cause of the initial failure was located in a failed relay coil in one of the parallel flame-detector circuits. Ignition leads cause periodic trouble from insulation failure. Flame-detector circuits handle relatively weak signals generated by thermopiles. These are subject to trouble from insulation failure and high resistance junctions.

LOCOMOTIVE 55
One control failure

August 6: Locomotive was held for unscheduled work consisting of replacing an electrically grounded flame-detector panel. Failure of the panels usually is caused by failed insulation.

(Continued on next page)



Compressor stator blade erosion takes place at the base of the blades. Union Pacific investigations indicate reblading after 15,000 hrs.

LOCOMOTIVE 56
One mechanical failure

August 15: Locomotive was held to change the atomizing air compressor because of slight pressurization of the lube-oil tank. This was not an effective remedy, so the locomotive was again held while investigation determined that the source of pressurization was in turbine main-bearing seals. It was necessary to remove the turbine and dismantle it to learn that the No. 3 bearing seal was worn due to vibration introduced by a clearance fit instead of the required interference fit at the spline hub at the flexible connection between the turbine and compressor. This minor mechanical fault took the turbine out of service for nine-days during August. It was unfortunate that the failure occurred while the spare turbine was not available during compressor reblading. This machine had accumulated a total of 15,463 hr since it was put into service in February, 1952. It had been operated only 369 hr since the last disassembly to replace bearing wiped because the lube-oil tank had been blown dry.

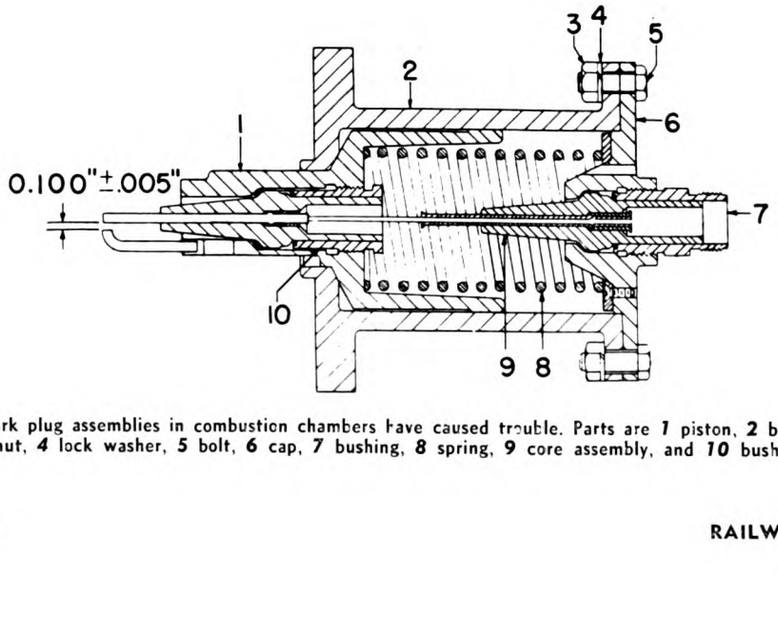
LOCOMOTIVE 58
One control failure, one mechanical failure, one wear failure

August 6: Turbine failed to fire leaving North Platte, resulting in delays of 30 to 50 min to five manifest trains. Inspection developed that both spark-plug leads were shorted. The turbine alternator-field contactor was sticking, making it impossible to complete the turbine-cranking cycle.

August 11: Locomotive was delayed 50 min because it was impossible to crank the turbine successfully after a shut-down for test group to make adjustments in temperature control.

August 15: Locomotive lost 1 hr 30 min running time because of low power turbine. This defect was caused by eroded compressor blading which resulted in loss of compressor efficiency and net power.

August 15: Locomotive suffered delay due to failure of a wire-reinforced neoprene hose used as a flexible connection between locomotive piping and turbine-fuel pump. The hose carries diesel fuel used as fuel-pump control oil. Age of the hose could not be determined.



Spark plug assemblies in combustion chambers have caused trouble. Parts are *1* piston, *2* body, *3* nut, *4* lock washer, *5* bolt, *6* cap, *7* bushing, *8* spring, *9* core assembly, and *10* bushing.

LOCOMOTIVE 59
One control failure

August 1: Locomotive lost 30 min running time due to low turbine power. investigation developed a cracked bellows in a pneumatic temperature control device giving false indication of excessive temperature. The failure of the bellows was due to fatigue caused by vibration.

LOCOMOTIVE 61
One control failure

August 24: Locomotive experienced failure similar to that of Locomotive 59. Temporary repairs were made by bypassing the pneumatic relay involved without loss of temperature control. This raises doubts as to whether the device is necessary.

LOCOMOTIVE 65
Two control failures

August 10: Locomotive was removed from a train departing from Cheyenne because the turbine quit firing. Investigation developed that failure was caused by movement of a plastic-insert-type lock nut which loosened from vibration.

August 29: Turbine died resulting in a 1 hr 5 min delay. Inspection failed to develop a reason for the failure.

LOCOMOTIVE 67
One control failure

August 24: Turbine would not fire at Ogden. Investigation developed that both high-voltage ignition-plug leads had failed.

LOCOMOTIVE 69
Two control failures

August 8: Locomotive delayed 1 hr 30 min. Investigation disclosed that a pneumatic time-delay relay used in the cranking cycle failed to function. This prevented completion of cranking.

August 12: Turbine quit firing. Investigation finally developed that erratic

(Continued on page 52)

ICC Would Get 'Tough' on Brakes

Safety appliance act changes recommended as ICC cites 'deterioration' in inspection and maintenance

Railroad air brake maintenance and inspection practices have "progressively deteriorated" over the past three years according to the 70th annual report of the ICC. The commission went on to recommend that the Safety Appliance Acts be amended to give the commission "authority to prescribe rules, standards and instructions for the installation, inspection, maintenance, and repair of power or train brakes."

"The suggested legislation," the commission also said, "is needed because it has become apparent that the carriers are unable to cope with non-observance of their own rules, or by design, have attempted to evade the minimum requirements of safety. . . . Even among railroads which have adopted the voluntary code of the Association of American Railroads, there has been wide spread non-observance of the rules, particularly with respect to train-brake inspections.

"The proper inspection, maintenance, and testing of power or train brakes by the carriers are absolute requisites for safe train operation. We urge that the Safety Appliance Acts be amended as recommended in order to provide the degree of safety therein contemplated for employees and the traveling public."

This recommendation amounted to commission performance on its promise to the BLF&E and BRT. The promise, to seek legislation, was made in a report in which the commission found that it lacked power to prescribe brake-inspection rules sought by the Brotherhoods (Railway Locomotives and Cars, March, 1957, p. 16).

Larger Fines

The report of the ICC's section of railroad safety of the bureau of safety and service, made to the commission, recommended that the penalty for violation of the Safety Appliance Acts be raised from $100 to $500. The $100 penalty was fixed in the act in 1893. The section report stated that "In the period of more than 60 years since that time, the value of the dollar has decreased to such an extent as to make the present penalty of little value as a deterent to violating the law. To bring this penalty more in line with present-day values and restore its intended function, it is recommended that it be increased to $500 for each violation." No action has been taken on this.

The safety appliance defect ratio for locomotives, freight and passenger cars for the year ended June 30, 1956, was 36 per cent higher than the average for the last ten years, and it was the highest recorded during that time. Only the figures for 1954, 1955 and 1956 exceeded the ten-year average, and the 1956 results are up 15 per cent over 1955.

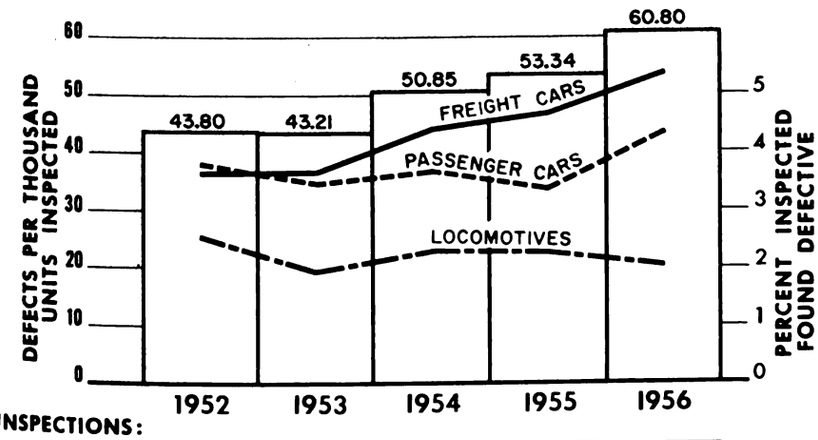
Of the 1,157,816 freight cars inspected, 5.33 per cent had defective safety appliances. This exceeded the passenger car ratio which was 4.36 per cent and the locomotive figure which was 2.03 per cent.

During the year, 61 complaints were investigated. Thirty involved power brakes and 31 involved other safety appliances. In 19 of these investigations, evidence of violation was obtained and prosecution on 134 counts was instituted. The section report went on to say that in many other cases "investigation resulted in the unsatisfactory conditions complaint of being corrected."

Brake Tests

In a case involving the Alabama Great Southern in which a safety appliance became defective on a car during a continuous movement to a point of interchange with a connecting carrier, a Fifth Circuit court held that "nothing less than literal compliance will suffice, and that the statutory liability arises irrespective of any duty of inspection and regard-

ICC Finds More Safety Appliance Defects



INSPECTIONS:

	1952	1953	1954	1955	1956
FREIGHT CARS	1,185,675	1,253,590	1,347,710	1,208,586	1,157,816
PASSENGER CARS	29,079	38,115	42,342	41,040	39,953
LOCOMOTIVES	13,184	14,303	15,741	14,177	13,797

less of a complete lack of fault on the part of the railroad."

Although cars in trains arriving at terminals and checked by ICC inspectors had 97.9 per cent of the air brakes operative, the report pointed out that 9.14 per cent of them were of "impaired efficiency due to excessive piston travel." Trains departing terminals, and checked, had 99.9 per cent of the brakes operative, but it was necessary to repair brakes on 4,634 cars remaining in trains, and to set out 3,221 cars. The average departing train had 47.3 cars and it was necessary to set out or repair an average of 3.16 of these. Had these trains departed prior to inspection, the section reported that " the percentage of operative brakes would have been only 93.2."

Here Is What ICC Inspectors Found During Train-Brake Tests

	Trains Departing From Terminals	Trains Arriving At Terminals
Railroads	139	110
Trains Inspected	2,484	1,588
Cars Inspected	117,399	96,962
Brakes Cut Out	8	275
Brakes Did Not Apply	141	1,805
Cars Not Controlled By Air*	152	2,083
Cars Controlled By Air	117,247	94,879
Cars Controlled By Air (Percent)	99.9	97.9
Excessive Piston Travel	5,360	8,867
After Inspection Began:		
Cars Set Out	3,221	.....
Cars Repaired In Train	4,634	.....

*—Whenever the sum of cars with "Brakes cut out" and cars with "Brakes that did not apply" is less than the number of "Cars not controlled by air," the difference is the number of nonair cars hauled in the trains tested.

AAR Opposes Pending Brake Laws

Enactment of pending legislation requiring the Interstate Commerce Commission to prescribe rules for power or train brakes would "impose more regulation upon an already over-regulated industry."

The proposed legislation, Richard G. May, vice-president in charge of the Operations and Maintenance Department, Association of American Railroads, testified before a subcommittee of the House Interstate and Foreign Commerce Committee, "would establish unnecessary rigidity and require the expenditure of effort and money by the railroads that might better be spent on other matters that are of at least equal importance in railroad safety."

Terming the legislation "unnecessary" and "without justification," Mr. May went on to point out that the proposed bill could delay the adoption of new devices, improvement in present power operated brake systems, new methods of inspection and new methods of repairs.

He asserted that if this were to materialize "railroads would lose for long periods of time the benefits of much needed economies, improved efficiency and even greater safety."

As important as power brakes are in the railroad safety picture, Mr. May continued, of equal importance are automatic block signals, centralized traffic control, durable rails, ties, bridges and many other elements that combine to keep the railroads running.

The railroad officer said passage of the pending legislation would give the ICC jurisdiction over a legitimate field of managerial discretion where management has compelling motives for maintaining the highest degree of safety and efficiency.

In such an instance, he cautioned, railroad management would thereby be precluded from adopting brake safety procedures prompted by their need to improve safety without the necessity of long hearings and the attendant delays necessarily associated with administrative procedures.

This, Mr. May said, would prevent the exercise of initiative and acceptance of responsibility by management in an important area of operations.

Gas Turbine Failures

(*Continued from page 50*)

operation of the fuel regulator was responsible.

LOCOMOTIVE 70
One mechanical failure, one error

August 6: Locomotive was held to change a failed atomizing air compressor. Investigation developed that failure was caused by excessive turbine vibration. After the turbine was disassembled, source of the vibration was traced to a manufacturing error. A short turbine-rotor shaft at the No. 3 bearing resulted in a short interference fit at the spline hub. The short fit wore excessively after 1,989 hr.

LOCOMOTIVE 73
One mechanical failure

August 12: Turbine died on the road. The train was delayed 2 hr 30 min with three other trains held up from 30 min to 1 hr while obtaining a replacement locomotive. The trouble was found in the fuel regulator, which had jammed and stripped gears in the drive mechanism.

LOCOMOTIVE 75
One control failure

August 12: Turbine quit firing leaving Cheyenne. Defect was traced to air leaking from wire-reinforced hoses used in connections to the turbine temperature control panel. Hose had become porous due to baking from external heat in the vicinity.

SP Building 350 Hydracushion Box Cars

With the completion of two years of successful road tests, the Southern Pacific now plans to construct 350 of the new hydracushion underframe box cars at its Sacramento shops.

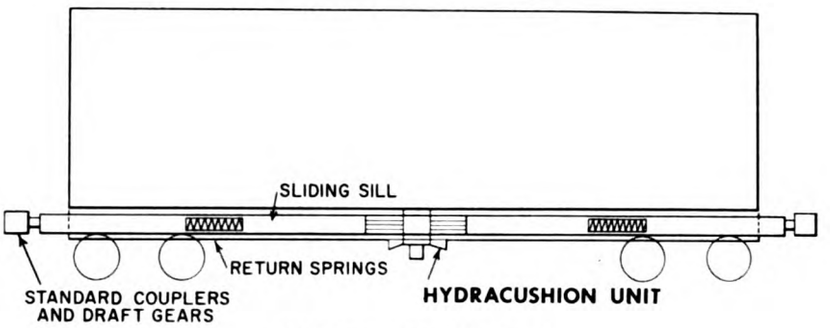
Developed by the Stanford Research Institute, under SP's sponsorship in conjunction with SP research engineers, this new underframe is designed to ease the shock of coupling cars. The package unit now to be used replaces the original design described in our June, 1955, issue, p. 61. According to SP officials, the device reduces the impacts of cars meeting at 10 mph to the equivalent of a 4-mph coupling.

The main parts of the device, says the SP, are a set of sliding friction plates actuated by a hydraulic device to produce cushioning action between the carbody and the floating car sill. This floating car sill runs the length of the car and carries the couplers and standard draft gears.

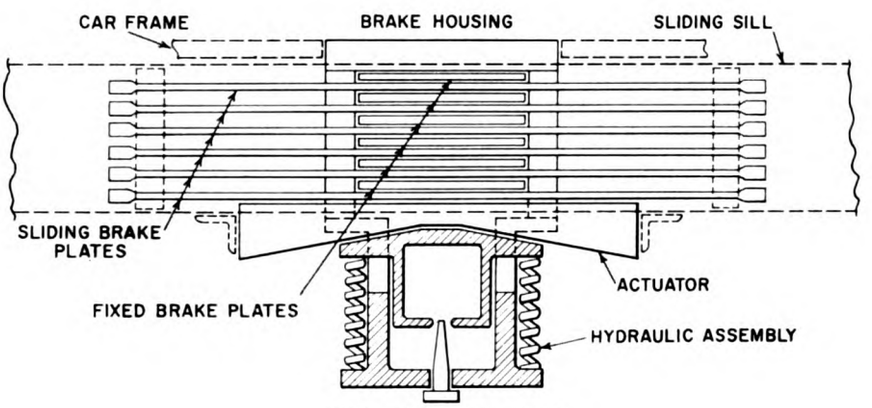
Absence of Recoil

As the car sill moves under the shock of coupling, hydraulic pressure from the cylinder squeezes the sliding brake plates against the fixed brake plates producing shock absorption without undesirable recoil proportional to speed and severity of impact. The springs return the sliding car sill to normal position.

Other special features being incorporated in the new box cars will include Evans DF loaders and roller bearings.



GENERAL ARRANGEMENT



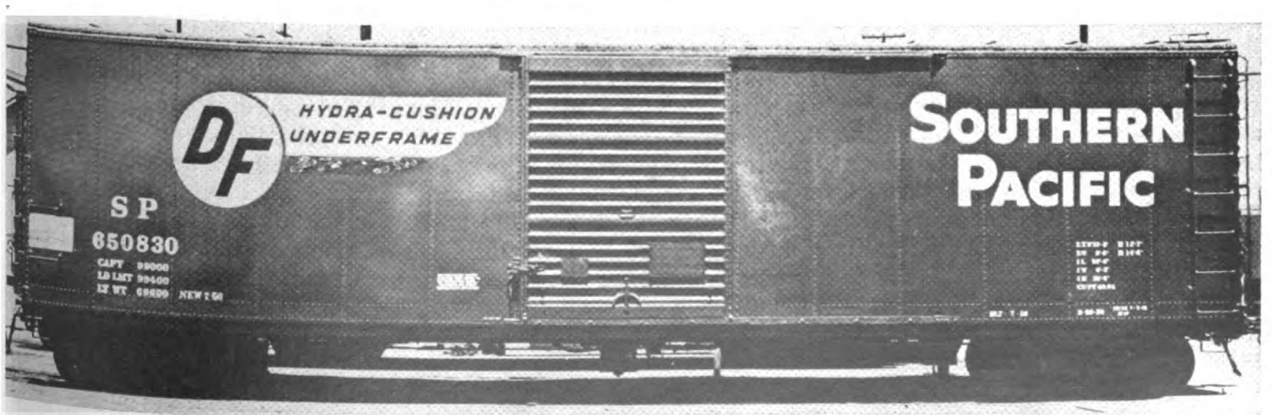
HYDRACUSHION UNIT

Hydracushion unit is mounted at center of the car. Earlier model had brake housings near bolsters.

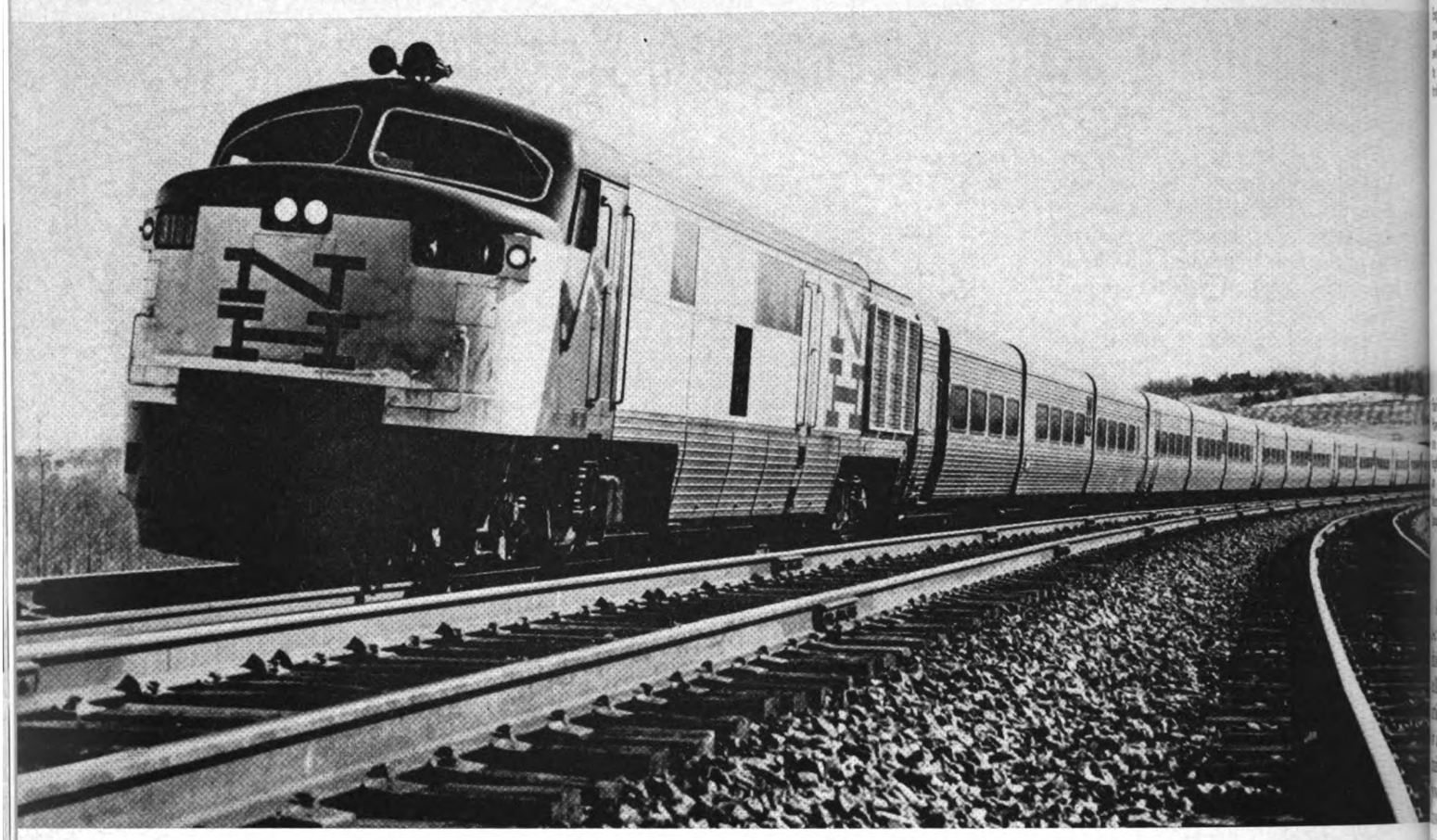
Striking Car Sill Loads During 7-mph Impacts

Striking cars were equipped with various energy absorbing arrangements, and data was obtained from oscillograms made during tests. All cars weighed 169,000 lb and the struck car was equipped with standard friction gears.

	Buff (lb)	Recoil (lb)
Friction Draft Gear	660,000	140,000
Rubber Draft Gear	515,000	150,000
Cushion Underframe A	410,000	165,000
Cushion Underframe B	265,000	180,000
Hydracushion	220,000	0



Hydracushion underframes, DF loaders and roller bearings are all being used in 350 new SP box cars.



'Speed Merchants' Haul New Haven Talgo

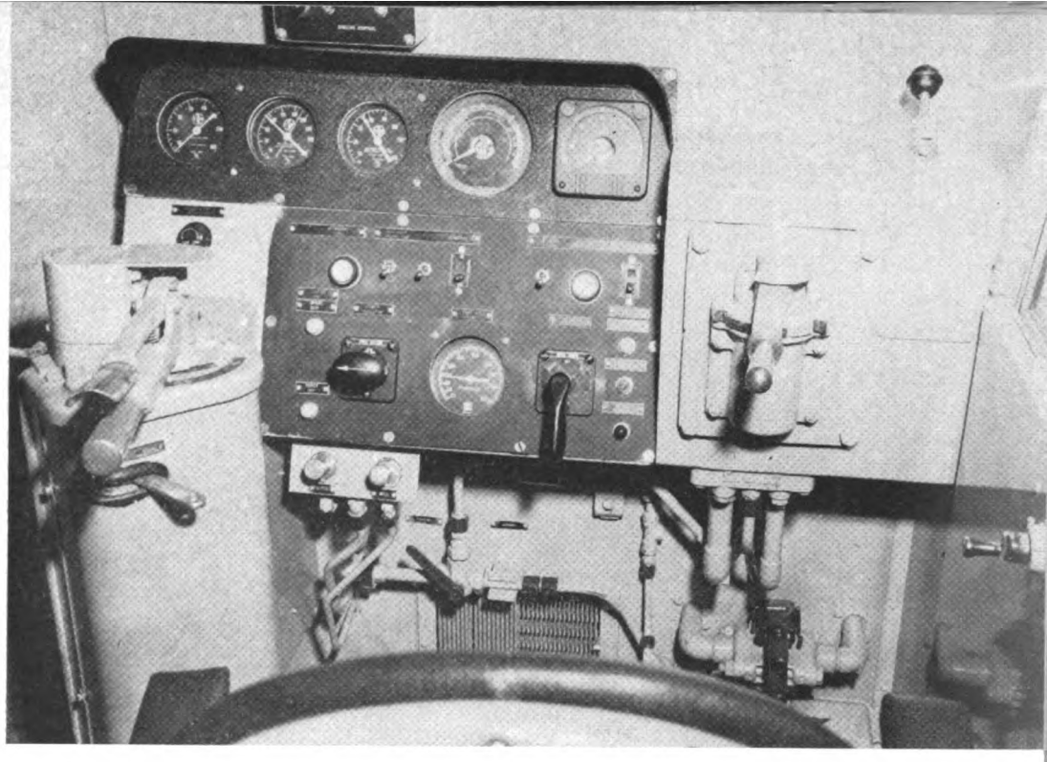
Each of the two 1,720-hp Fairbanks-Morse lightweight locomotives has a single, constant-speed diesel engine.

Two 1,720-hp Fairbanks-Morse "Speed Merchants" are hauling the New Haven Talgo streamliner, the "John Quincy Adams," between Boston and New York. The "Speed Merchants" were designed to haul the five-car ACF Talgo at speeds up to 115 mph, and to have sufficient power to accelerate the train up to 80 mph in 4.45 min and 4.2 miles. The locomotives switch from diesel-electric to third-rail power while in motion, eliminating the necessity for changing to electric locomotives. The "John Quincy Adams" has one "Speed Merchant" at each end, one pulling and the other pushing. The train operates equally well in either direction, and both locomotives can be controlled from either cab. There is no need to turn the train for the return trip.

The design of this locomotive is intended to cut initial cost, fuel consumption, and maintenance expense. The major means of accomplishing these was to make one diesel engine provide power both for traction and for train service. This eliminates the need for any auxiliary engine. This led to lower weight, demanded less space, and reduced the quantity of auxiliary equipment. It means only one engine per locomotive to crank for the changeover from third-rail to diesel-electric power.

Standard FM Engine

The Speed Merchant's single prime mover is an 8-cylinder Model 38D8⅛ Fairbanks-Morse opposed-piston diesel with a rating of 1,720 hp at 850 rpm. The diesel drives a 600-v dc main traction generator and a 436-v, 3-phase, 56.7-cycle alternator to supply all train service requirements. In conventional locomotives, the main engine varies its speed to meet load fluctuations. In the Speed Merchant, the single diesel runs constantly at 850 rpm, providing steady voltage and frequency for the train service equipment despite the varying traction requirements. This constant-speed, variable-load operation is similar to stationary power plant service. Instead of varying engine speed, the Speed Merchant regulates output of traction power by controlling the generator field through the amplidyne exciter.

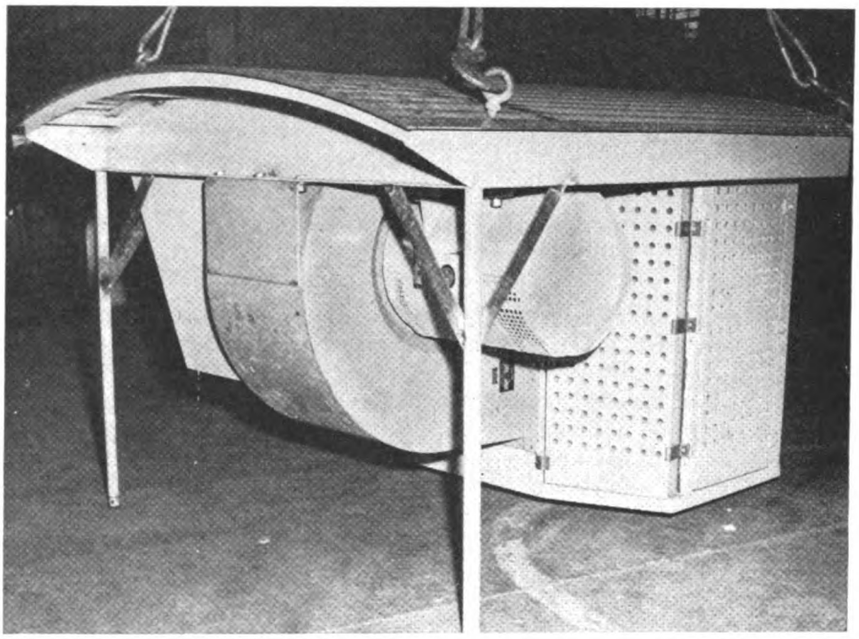


Engineman's controls include controller and reverser (left), diesel-electric and third-rail switchover (oval knob), single push button to start engines in both units, and the control for Westinghouse "26" air brake (right).

Fairbanks-Morse locomotives on ends of New Haven Talgo each weigh 216,000 lb. Units are 60-ft long, 10-ft 6-in. wide, and 12-ft high. Third rail shoe assemblies are mounted on inboard ends of each truck. "Speed Merchants" were originally described in the January 1956, issue, p. 43.

ACF calculates that maximum a-c electrical demand for air conditioning, heating, lighting and miscellaneous needs of one three-unit articulated car approximates 40 kw, or a total of 200 kw for the five-car train. The cars depend on head end power for normal operation but have batteries and trickle chargers for emergency use. Except in severe winter cold, just one of the two locomotive units could handle the needs of all five cars without cutting into traction power. Each diesel has a minimum of 1,200 hp available for traction at all times, a total of 2,400 hp for the two locomotives.

The traction generator is a conventional GE shunt-field machine with a series winding for cranking the engine from the battery; there is a standard belt-driven 12 kw, 75-v dc auxiliary generator. The two traction motors on the truck at the cab end are GE 752's.

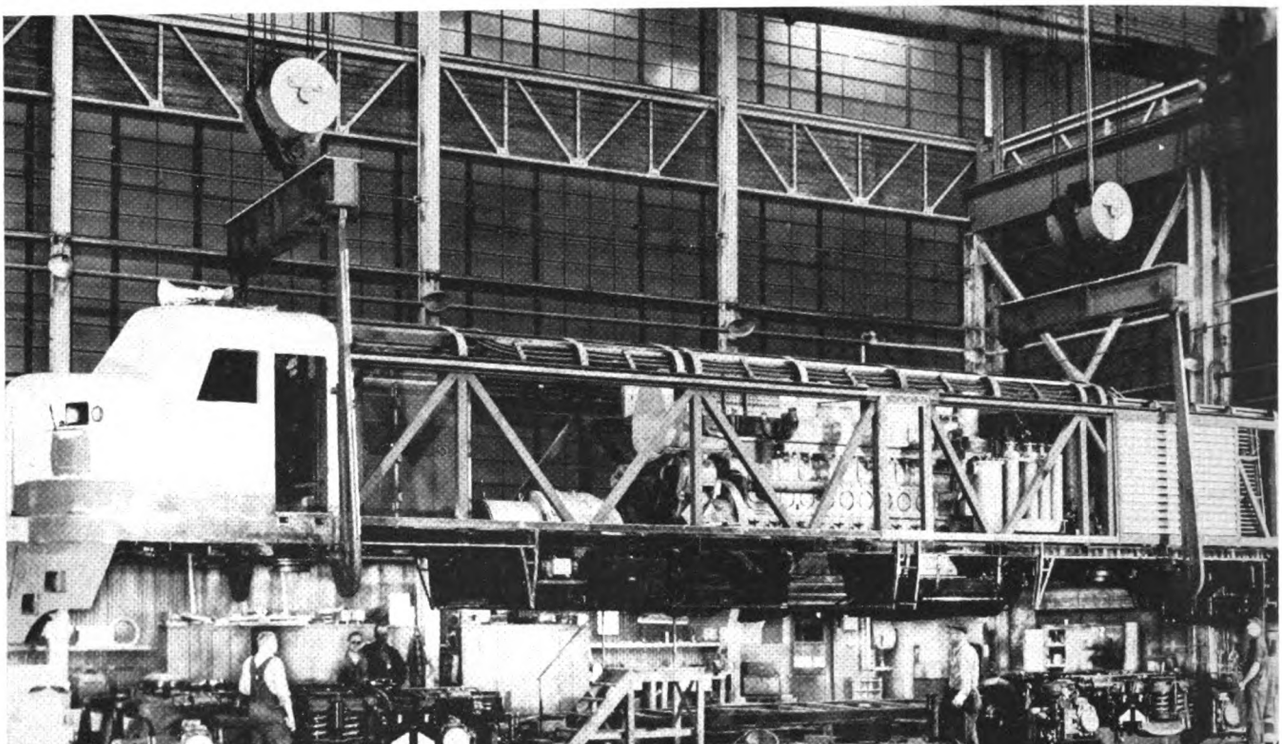


Engineroom air is taken at roof level by 20,000 cfm blower through a set of self-scavenging centrifugal dirt separators. Equipment operates under slight pressure instead of in vacuum of conventional diesel locomotives.

Special Electrical System

As described to this point, the locomotive is available for regular light train diesel-electric service and two such units are on order for the Boston & Maine. For the New Haven train, electrical equipment was arranged and additional equipment provided to permit operation on third-rail power. The main dc generator still is driven directly through a flexible coupling, but the 233 kw alternator and an added 600-v dc generator are driven through an overriding clutch. During diesel-electric operation, this auxiliary 600-v machine supplies power to the air compressor, traction motor blowers and fan motors. When locomotive moves into third-rail territory, however, this dc generator becomes a motor operating on third-rail power and performs its primary function of driving the alternator, assuring uninterrupted train service. The traction motors, as well as the 600-v motor-driven auxiliaries, then get their power supply directly from the third rail. Despite normal variations in third-rail voltage, the alternator is run at constant speed by using the amplidyne exciter to govern excitation of the drive motor.

When starting the train in diesel-electric operation, the controller progressively increases amplidyne excitation and resultant main generator excitation, developing a family of generator curves similar to conventional locomotive curves with a variable speed engine. During third-rail operation, automatic resistor control is provided for smooth acceleration in 12 steps under control of a current relay. Notching is automatic but under the control of the engineman who may vary rate



Main sills on 69-in. centers with dropped mid-section permit mounting engine with its lower crankshaft 48-in. above rail. Outside swing hanger trucks have bolster coil springs and friction snubbers on 97-in. centers.

of acceleration with the same controller handle used for diesel-electric operation.

Here is how the switchover from one power source to another is accomplished: With the train operating on third-rail power, the motor-alternator set is running at a speed between 850 and 900 rpm, with the controller in one of the operating positions for third-rail propulsion. Traction motors are in series on full field. Preparatory to changing over, the diesel engine is started by cranking with the main generator running as a series motor from the 64-v battery. The diesel is always warm and ready for a quick start because of third-rail-powered immersion heaters in the cooling water system and a special heat exchanger for the lubricating oil.

After the engine has started and run briefly at idle speed, it is brought up to its normal operating speed of 850 rpm and is ready to take the load. The engineman then moves the controller handle to idle and throws a transfer switch from third-rail to diesel-electric position. This disconnects the big dc motor from third-rail power. When the speed of the motor-alternator set drops to engine speed of 850 rpm, the overriding clutch engages and the dc machine, alternator, exciter and auxiliary generator are driven by the engine. Power and auxiliary equipment circuits are changed by a multi-contact transfer switch with controller at idle. The engineman then advances the controller for normal diesel-electric operation.

Special attention was given to keeping equipment free of contamination. The engine room of the Speed Merchant is pressurized to 0.5-in. of water with a centrifugal blower. Air for the diesel is farther cleaned in centrifugal separator intake air cleaners which are continuously scavenged through aspirators in the exhaust stacks. The main generator and other rotating equipment in the room are cooled by self ventilation, discharging a high percentage of the total volume of cooling air to atmosphere. The motor-driven two-stage air compressor draws air from the engine room and discharges through a finned-tube aftercooler to two main reservoirs connected in series. Each traction motor is force-ventilated with outside air by a motor-driven blower directly below the cab.

A separate section at the rear of the main engine room houses the engine cooling system, including radiators, inlet shutters, and motor-driven exhaust fan. Located between the two radiator banks and giving minimum air flow interference is the 725-gal fuel tank.

Line of draft at the rear coupler is nominally 21 in. above the rail. The coupler contains connectors to trainline all locomotive and train service functions, so that coupling locomotive to train automatically makes all connections necessary for operation. With center of gravity of the sprung mass only 24 in. above the plane of the bolster springs (40 in. for a conventional locomotive) and spring centers of 97 in. (compared to a conventional 60 in.), the Speed Merchant has substantially less lean or roll.

Clasp-type brakes on all wheels have composition shoes. The brakes will produce a retardation rate of about 1.5 mph per sec. The air brake control equipment utilizes one trainline pipe for both control and air supply.

HOW TO

Learn About Air Brakes

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24-RL Automatic Brake Valves

D-24 Brake Valve

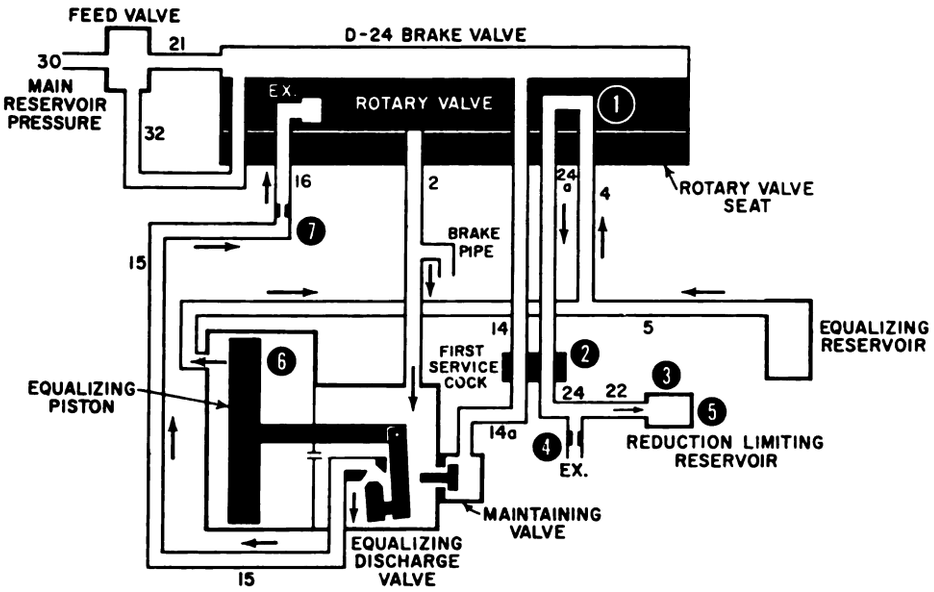
Installment IE

FIRST SERVICE Position—First Phase (Sketch 10)

FIRST SERVICE position application causes a normal, light, initial reduction, then reduces the brake pipe pressure at a slow, controlled rate. This prevents an excessive difference in brake cylinder pressure between the front and the rear of the train. In the first phase of first service, the equalizing reservoir pressure is connected to the empty reduction limiting reservoir (through the first service cock), reducing equalizing reservoir pressure about six lb at the normal rate.

Color in carmine the short branch of passage *30* to the block marked *Feed Valve*. With orange, color the feed valve, passage *21*, the entire space over the rotary valve, and passage *32* back to the feed valve. Go into passage *14*, through the first service cock, passage *14a*, and the space around the maintaining valve. Dampen and let dry.

With yellow pencil, fill the entire area to the right of the equalizing piston. Continue through the choke and the space around the equalizing discharge valve, and then through passage *2* to the rotary valve. Color past the open equalizing discharge valve into passage *15*, passage *16*, and then to the atmosphere at EX. After the yellow has been dampened and let dry, proceed in light green into the space at the left of the equalizing piston, passage *5*, the equalizing reservoir, passage *4* to and including the cavity in the rotary valve. Stop where the rotary valve contacts its seat. From there, fill in with dark green passage *24a*, through the first service cock, passage *24*, pipe *22*, and the reduction limiting reservoir. Include the short branch through the choke to EX. Dampen and let dry.

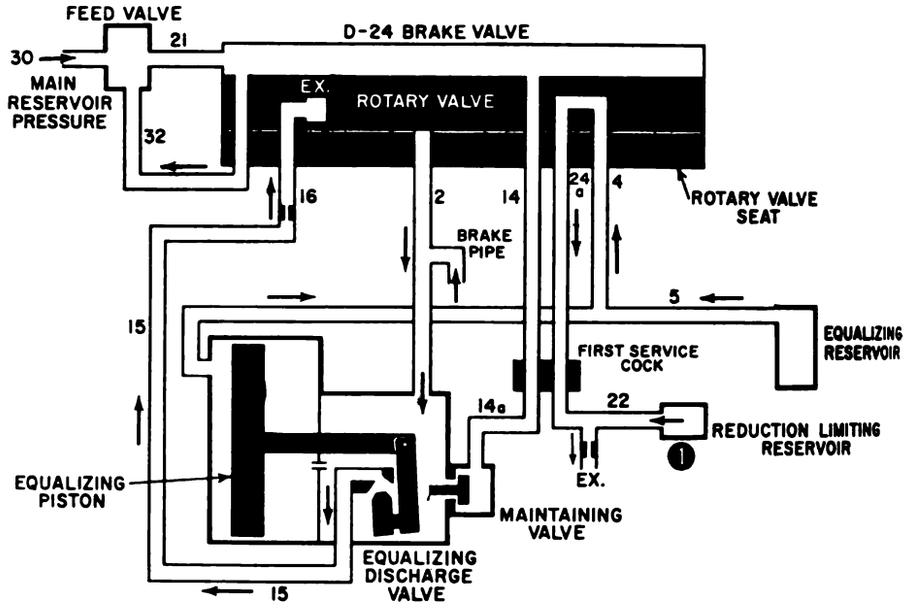


Sketch 10
FIRST SERVICE Position—First Phase

1. **Equalizing reservoir pressure in passage *4* to passage *24a*.**
2. **From passage *24a* through the frst service cock into passage *24*.**
3. **Passage *24* to pipe *22* to the reduction limiting reservoir.**
4. **From the reduction limiting reservoir to EX through the choke.**
5. **The equalizing reservoir pressure expands into the reduction limiting reservoir, reducing the equalizing reservoir pressure about six lb at the normal rate.**
6. **The equalizing piston moves to the left, opening the equalizing discharge valve.**
7. **Brake pipe pressure flows past the equalizing discharge valve into passage *15*, passage *16*, and then to exhaust.**

FIRST SERVICE Position—Second Phase (Sketch 11)

The flow of equalizing reservoir pressure into the reduction limiting reservoir has reduced this pressure about six lb, and the reduction continues at a much slower rate (from both reservoirs) through a choke. This sketch is colored the same as Sketch 10. Note that the flow of air is now from the reduction limiting reservoir, as the volume of both reservoirs reduces through the choke.



Sketch 11

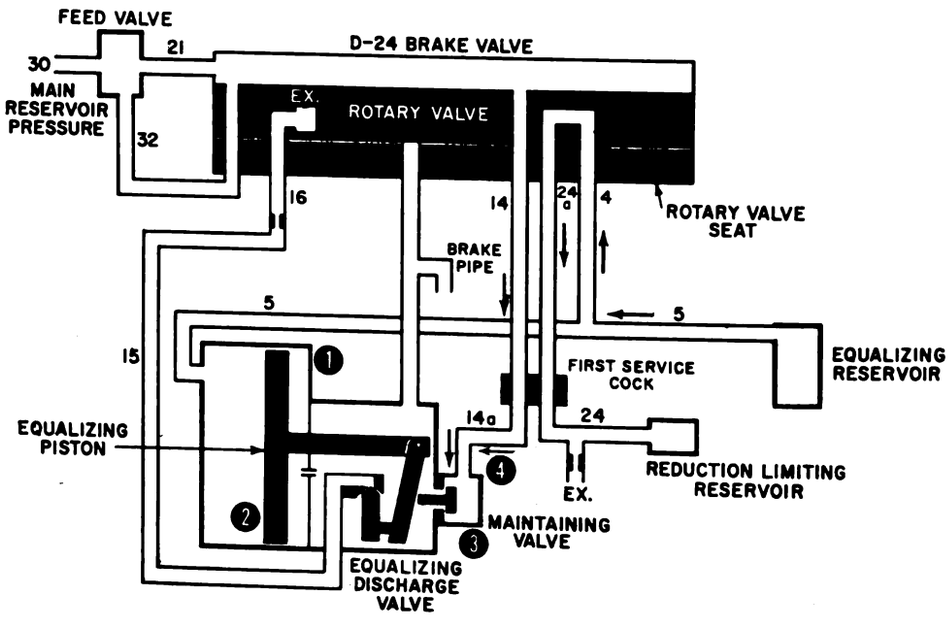
FIRST SERVICE Position—Second Phase

1. **The remainder of the twenty lb reduction continues at a much slower rate. The volumes of both reservoirs flow through the choke to exhaust.**

Pressure Maintaining During FIRST SERVICE Operation (Sketch 12)

If the brake pipe pressure becomes slightly lower than that of the equalizing reservoir, the equalizing piston will move to the right and allow the equalizing discharge valve to close. This may be a result of too rapid reduction of the brake pipe pressure at the front of the train. This prevents further flow of brake pipe air to the atmosphere. If the brake pipe pressure reduces faster than the controlled rate of the equalizing reservoir pressure reduction, this pressure will be less than that of the equalizing reservoir acting on the left side of the equalizing piston. This moves the piston to the right, opening the maintaining valve and allowing feed valve air to flow into the brake pipe. Such an action causes a slower brake pipe reduction throughout the train than otherwise possible.

Changing to carmine, fill in the short branch marked *Main Reservoir Pressure* leading to the feed valve. Now switch to orange and color passage *21*, the space above the rotary valve, passage *32* to the



Sketch 12

Pressure Maintaining During FIRST SERVICE Operation

1. **Because of leakage the brake pipe pressure reduces at a faster rate than the controlled reduction of the equalizing reservoir pressure.**
2. **The piston is moved to the right, and the equalizing discharge valve seats itself.**
3. **The continued movement of the piston to the right opens the maintaining valve.**
4. **Feed valve air flows past the maintaining valve to the brake pipe.**

feed valve, passage *14* through the first service cock, passage *14a,* and on past the open maintaining valve. Stop at the equalizing discharge valve chamber. Dampen and let dry.

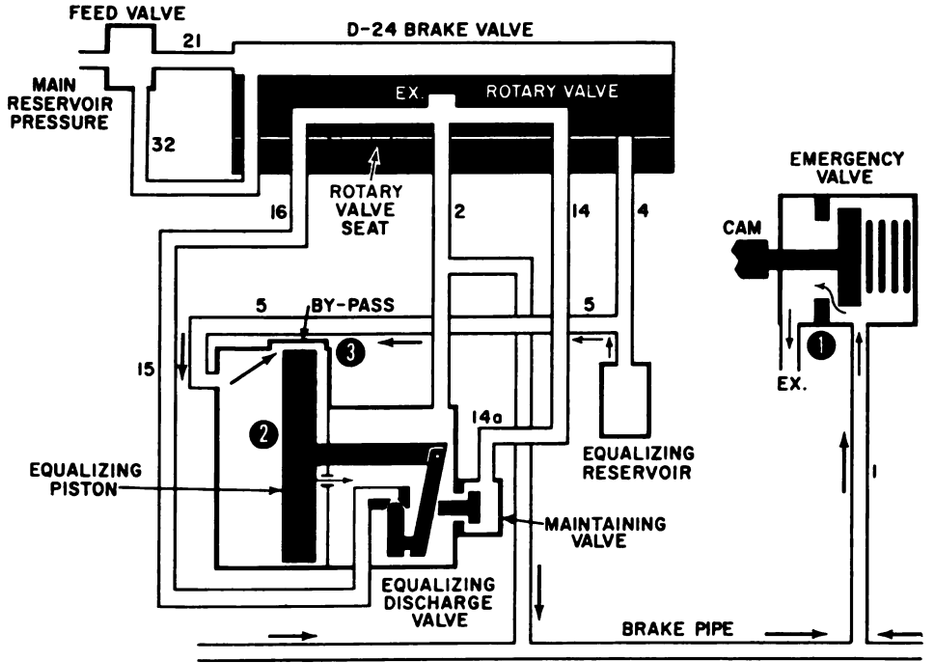
From this point, and with yellow, proceed into the equalizing discharge valve chamber, through the choke (including the space to the right of the equalizing piston), and into passage *2* to the rotary valve. In yellow dashes color passages *15* and *16* to EX. Dampen and let dry. Repeat the light and dark green shading as in sketches 10 and 11.

EMERGENCY Position (Sketch 13)

In the EMERGENCY position of the brake valve, the rotary valve connects the various passages as indicated in the D-24 Brake Valve position diagram. The emergency valve plunger unseats the emergency pilot valve (not shown), permitting the emergency valve to quickly unseat and provide a large, direct passage from the brake pipe to the atmosphere. An emergency rate of brake pipe reduction results. Equalizing reservoir volume is connected (by movement of the equalizing piston to the right) through a by-pass in the piston bushing, to the brake pipe volume, and then to the atmosphere.

Again with carmine, fill in the short branch marked *Main Reservoir Pressure* leading to the feed valve. Change to orange and shade the feed valve, passage *21,* the area over the rotary valve, and passage *32* to the feed valve. In orange dashes, continue into passage *14a,* the space behind the maintaining valve, and passage *14* to the exhaust passage in the rotary valve. Dampen and let dry.

At this point, and with yellow, color the space on both sides of the emergency valve and then to the exhaust. Fill in the area to the right of the equalizing piston, around the equalizing discharge valve, passage *2* to exhaust, proceeding to the main brake pipe, and passage *1* to the emergency valve. In yellow dashes fill passages *15* and *16* to the exhaust. Dampen and allow to dry. In light green finish off the equalizing reservoir and its connecting passages, including the chamber to the left of the equalizing piston. Dampen and let dry.



Sketch 13
EMERGENCY Position

1. **The emergency valve plunger unseats the pilot valve (not shown) and the emergency valve, providing direct passage from the brake pipe to the exhaust.**
2. **The equalizing piston is forced to the right by the higher equalizing reservoir pressure.**
3. **The equalizing reservoir pressure feeds through the by-pass in the piston bushing, into the brake pipe, and then to the atmosphere.**

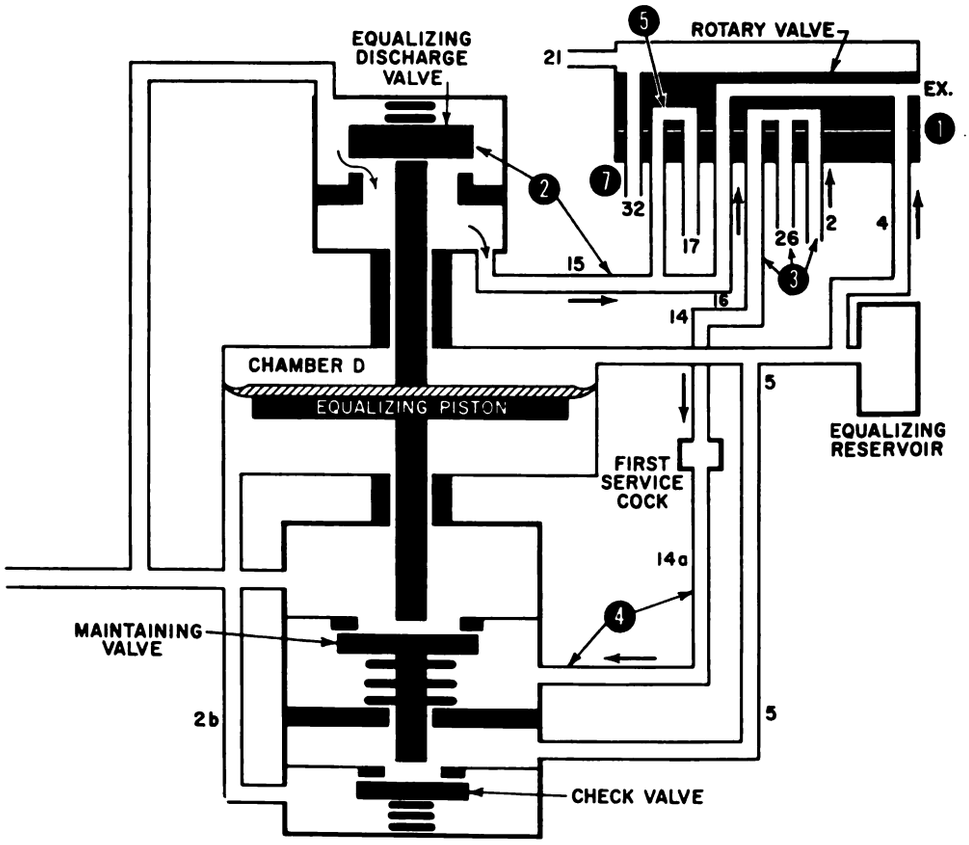
AUTOMATIC SERVICE
Position—Pressure Maintaining Feature Cut-out (Sketch 14)

With the pressure maintaining feature cut-out, brake pipe pressure is free to flow from passage *14*, (as supplied from brake pipe passage *2* through the rotary valve). This unseats the check valve in the first service cock portion and passes into passage *14a* to the space under the maintaining valve. With the pressure maintaining feature cut-in (to be shown later), feed valve pressure which is higher than the brake pipe pressure at this time, will hold the check valve closed. A branch of passage *14a* is connected through the maintaining cut-off valve with feed valve pressure. This flows to the space under the maintaining valve. The pressure maintaining feature must always be cut-out when making brake pipe leakage tests.

With a yellow pencil color the space on both sides of the equalizing discharge valve, the chamber under the equalizing piston, the space above and below the maintaining valve, and the space at the bottom of the sketch beneath the check valve. Color the passages connecting the above spaces. Continue into passage *15* and then into the rotary valve, stopping at the point where the rotary valve engages its seat in passage *17*. Follow passage *15* into passage *16*, and then to the exhaust cavity in the rotary valve. In yellow dashes color to EX.

Again with yellow color passage *2*, on into the rotary valve to passage *26*, stopping where the rotary valve engages its seat. Go on through the rotary valve cavity into passage *14*, through the first service cock, and into the chamber under the maintaining valve.

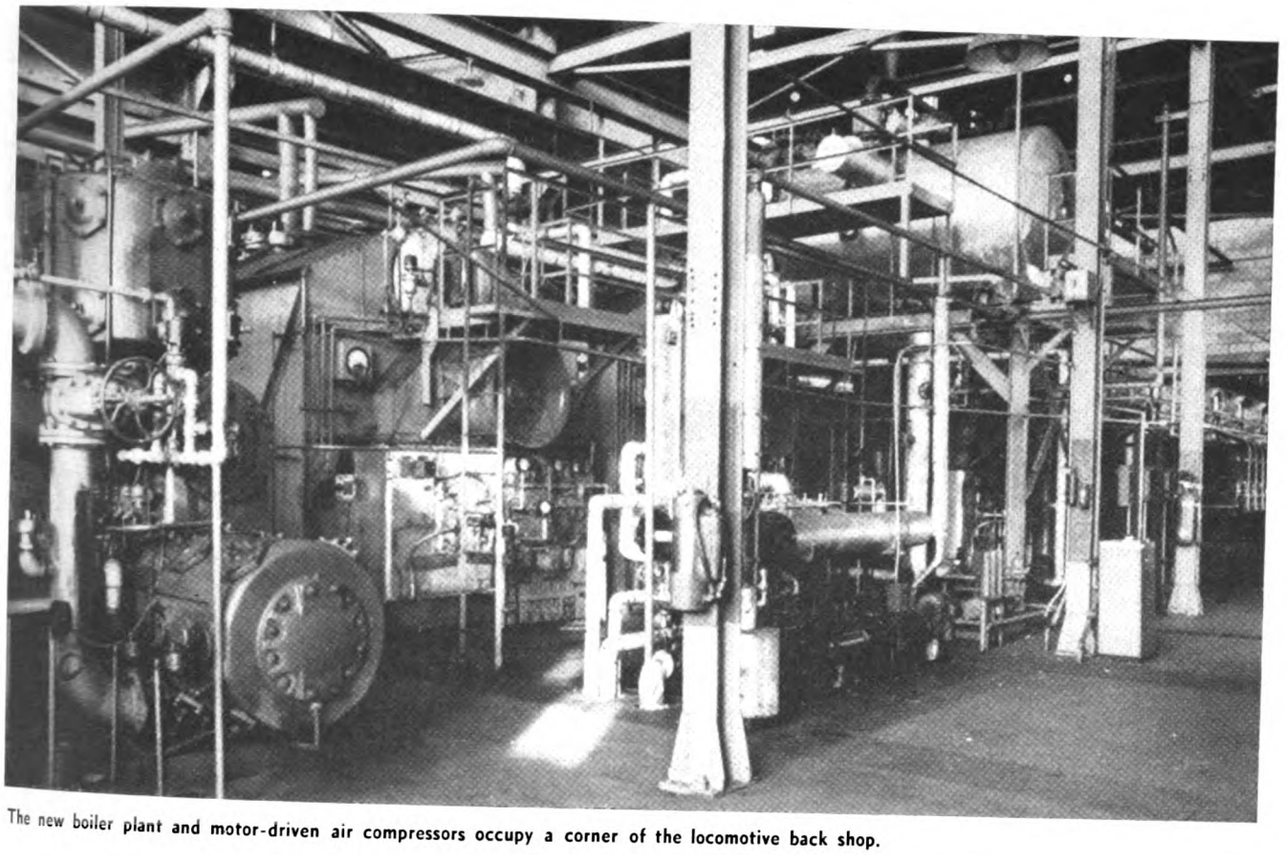
Switch to gray and fill passages *17* and *26*. Change now to light green and begin here by shading the equalizing reservoir, following passage *4* to the exhaust passage, passage *5* to chamber *D* over the equalizing piston, and the chamber above the check valve (by way of passage *5*). Now with orange, shade the space above the rotary valve and passages *21* and *32*. Dampen and allow to dry.



Sketch 14

AUTOMATIC SERVICE
Position—Pressure Maintaining Feature Cut-out

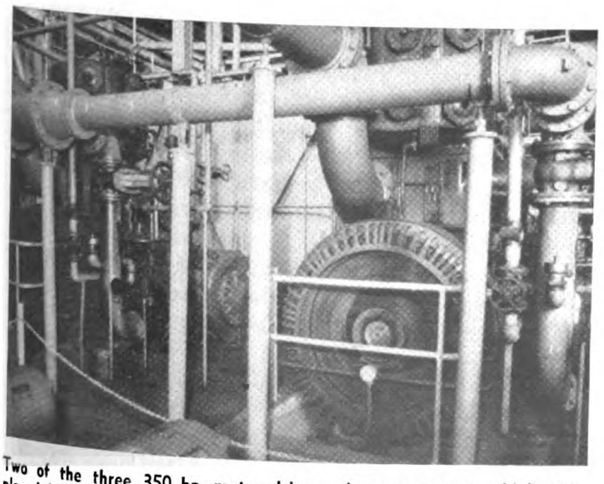
1. **Equalizing reservoir and chamber *D* to exhaust.**
2. **Brake pipe to *EX*, via passages *15* and *16*. (Reduction of equalizing reservoir pressure in chamber *D* allows brake pipe pressure to move piston up. Piston stem unseats, equalizing the discharge valve.)**
3. **Brake pipe passage *2* to suppression pipe *26* and passage and pipe *14*.**
4. **Passage *14*, through the first service cock into passage *14a* to the maintaining valve (closed).**
5. **Passage *15* to suppression pipe *17*.**
6. **Passages *22*, *33*, and *24a* to *EX* (not shown).**
7. **Passage *21* from the feed valve to passage *32* to the feed valve control chamber.**



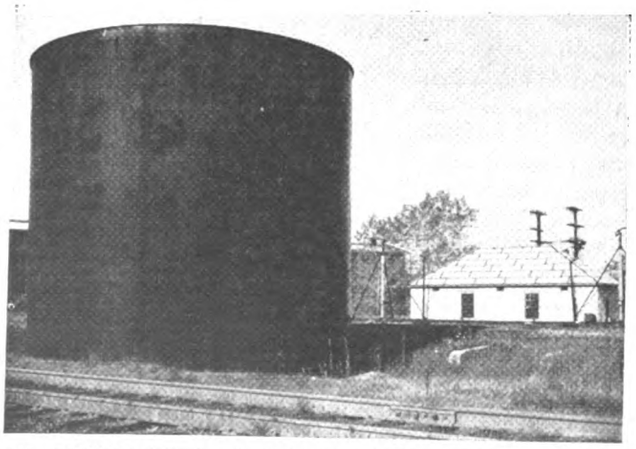
The new boiler plant and motor-driven air compressors occupy a corner of the locomotive back shop.

Lehigh Valley Cuts Power Costs 65%

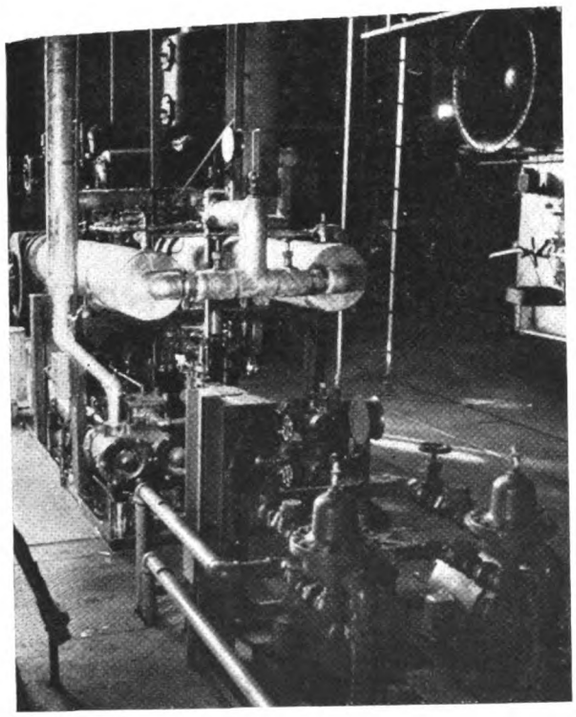
By installing a new boiler plant and purchasing electric power for all shop needs, including hammers and air compressors, the railroad will amortize an investment of $600,000 in a little over two years

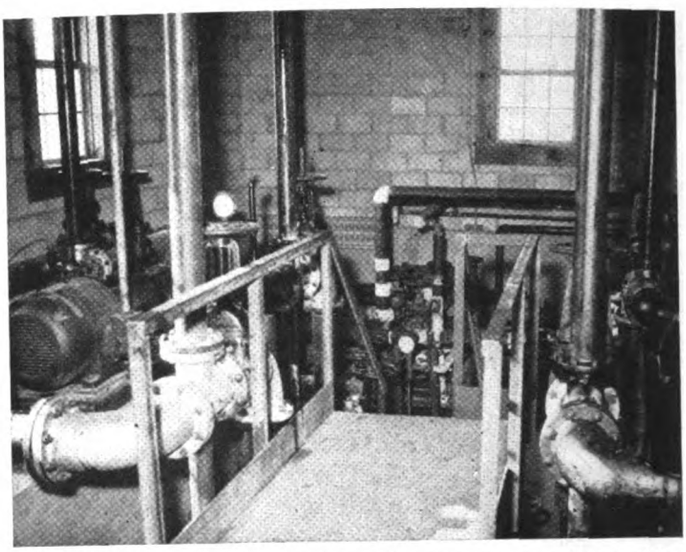


Two of the three 350-hp motor-driven air compressors which are placed beside the new boiler plant.



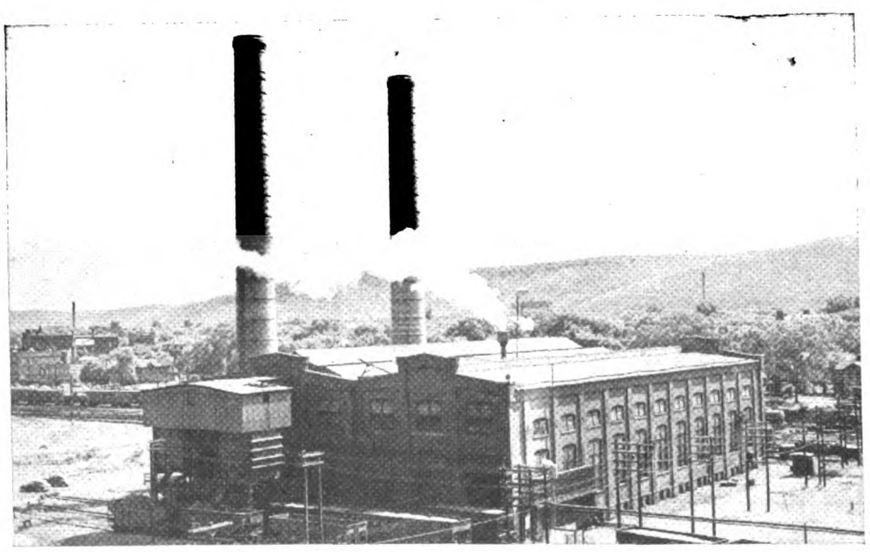
The 300,000-gal bunker C fuel tank and the oil pump house which can pump both Bunker C and diesel fuel oil.





Interior of the oil fuel pump house. It contains pumps for supplying either bunker C oil or diesel oil.

At left: The fuel pumps in the boiler plant. The two at the back normally supply bunker C oil. For starting up or for emergencies, the two in front can furnish diesel oil.



The former power plant which housed the steam-driven air-compressors and the steam-electric generators, has been abandoned. The building is now available for other railroad use or for rental.

THE LEHIGH VALLEY'S power plant at Sayre, Pa., built in 1904, was abandoned in 1954, and figures are now available to show the savings made by replacing the plant with a modern boiler plant and the purchase of electric power. The total cost of new equipment installed was $602,000, and the annual saving has been about $270,000. Some specific figures are as follows: cost of operation of the old plant, in which electric power was generated, for December 1953, was $44,328.67. Total cost of operation of the new plant, including the cost of purchased power, for December 1954 was $22,451.19. Strangely enough, the July 1953 costs of the former plant operation were $33,321.19, and those for the July 1956 operation of the new plant were $9,799.72. Thus, the saving at light loads is even greater than at heavy loads showing the high efficiency obtainable at light loads with the new arrangement.

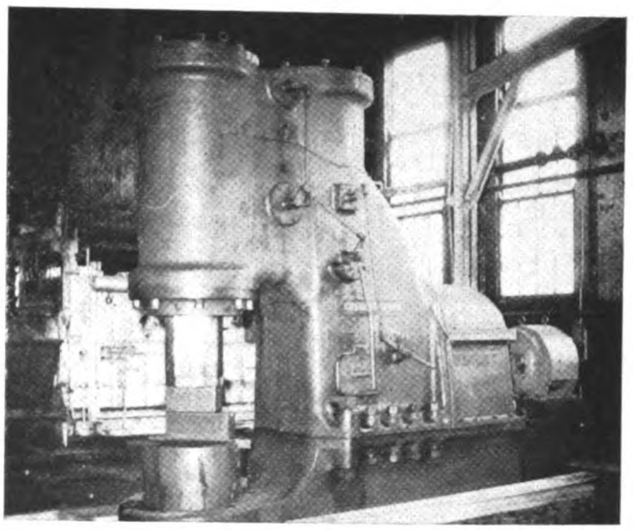
The old plant generated steam in 12 Wickes Bros. vertical, water tube boilers, totaling 3,660 boiler-horsepower. The fuel used was anthracite buckwheat coal and it was burned on chain grate stokers. Compressed air for the shops was supplied by four horizontal compound, direct-connected, steam-driven compressors. One of the compressors was rated 5,000 cfm, one 3,000 cfm and two 1,500 cfm. Two-phase, 440-volt electric power was generated by four vertical compound engines driving three 750-kw and one 400-kw generators. Two 300-kw motor generator sets were used to supply 250-volt d-c power for cranes and variable-speed motors

New Plant in Corner of Shop

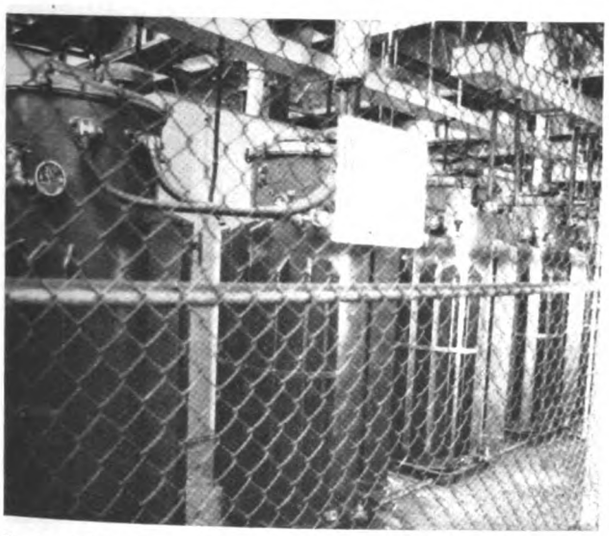
The former boiler plant was replaced by a new one located in the southwest corner of the locomotive back shop in an area that was used for flue cleaning. Electric power is now purchased, and what were formerly steam-driven compressors and hammers are now motor-driven.

The four boilers in the new plant which generate steam at 150 lb are oil-burning CPM package-type water tube boilers, supplied by the E. Keeler Company, Williamsport, Pa. Two are rated nominally at 304 boiler hp, and two at 353 boiler hp. They are operated at 200 to 250 per cent rating with a total capacity of 3,000 boiler hp. These high ratings are made possible by Todd

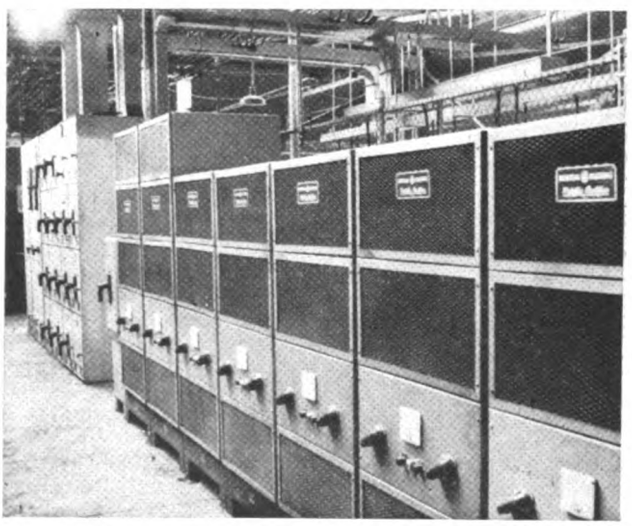
The Graver Zeolite water softener is used to condition all make-up water for boilers.



At right: The 3,000-lb electric motor-driven hammer. The motor drives an air compressor which supplies air for operating the hammer. This and a similar 500-lb hammer have eliminated the need of steam for hammer operation.



The two G-E transformers in front supply two-phase, 440-volt power, and the three behind furnish three-phase power for rectifiers.



Shop electrical circuits are controlled from the switchboard at the left. At the right are the seven 100-amp selenium rectifiers which supply 250-volt d-c power. This equipment is located on a balcony.

Shipyards Corporation oil burners which are controlled automatically by steam demand.

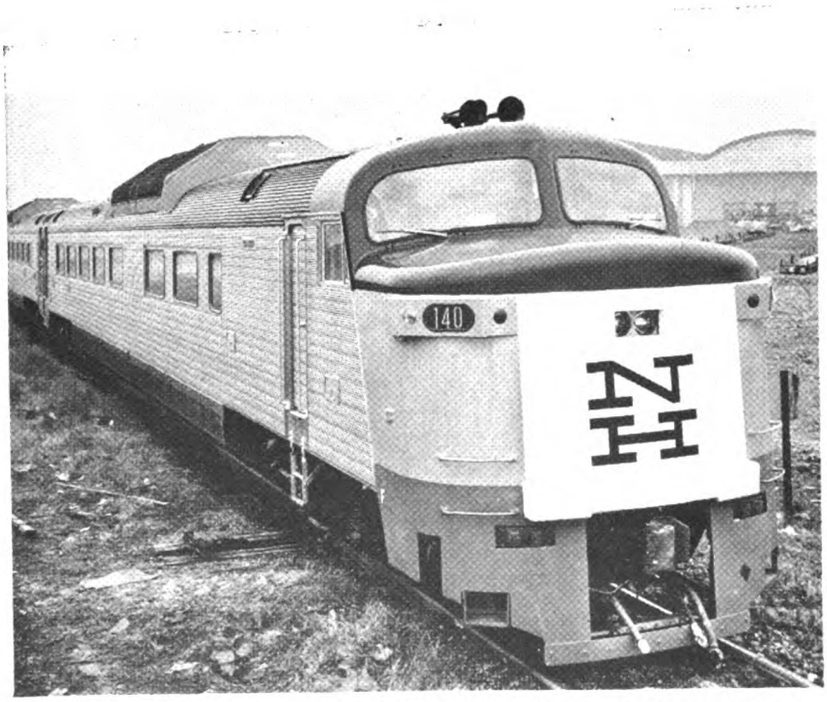
Fuel is bunker C oil, preheated to 180 deg F for atomization. It is supplied from a 300,000-gal storage tank, located about ¼ mile from the shop, from which the oil is pumped to a 30,000-gal storage tank adjacent to the shop. The oil line from the storage tank is heated to 110 deg F by a parallel steam line, the two being wrapped together with insulating material.

There is an oil pump house near the storage tank which is equipped to pump the bunker C oil to the day storage tank. It can also take oil from an 850,000-gal diesel fuel tank, and supply it to the boiler plant in case of a bunker C pump failure, or to start the plant in case of a shutdown.

Steam from the boiler plant is used for space heating, for parts cleaning including air filters and various other operations in the shop which require high-pressure, high-temperature steam. Condensate from steam used for space heating is returned to the boilers. Make-up water is treated by means of a Graver Zeolite water softener. Boiler water is preheated in a feedwater heater to a temperature between 180 and 200 deg F.

Three Ingersoll-Rand type XLE, 450-rpm electric motor-driven compound compressors, adjacent to the boilers, supply all shop air requirements. They are each rated 2,397 cfm, and each is driven by a Westinghouse 350-hp, 2,300-volt synchronous motor. The compressors cut in and out of service automatically, always assuring the needed supply of air, and the operation of a minimum number of compressors.

Electric power is purchased at 2,300-volts, 3-phase, and the 2-phase, 4-wire lines which supply the older motors in the shop are fed by two 167-kw General Electric 2,300/440-volt Scott - connected transformers. Three similar three-phase transformers supply power to seven 100-amp General Electric selenium rectifiers which in turn supply the 250-volt d-c lines in the shop.



A-unit RDC's are used on both ends of Budd-built New Haven train. Intermediate cars have only single vestibule and no operator's controls. One-piece, fiberglass-reinforced plastic unit forms top of the A-unit nose, windshield framing and cab roof.

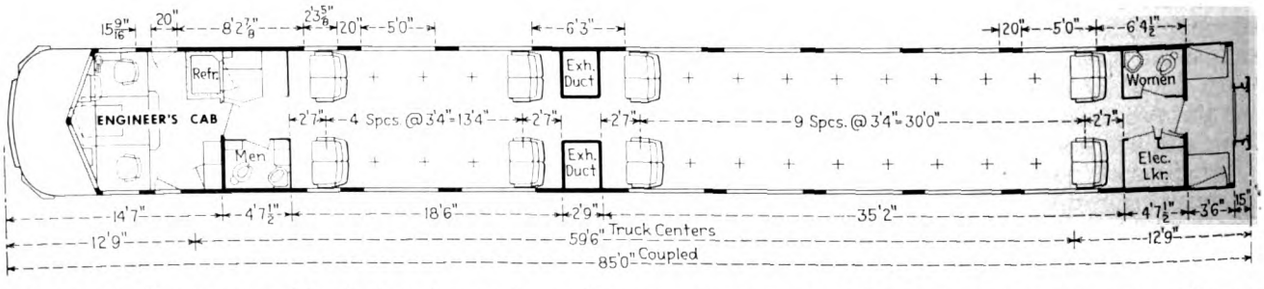
◀Cars have Adlake breather-type sash units. Plymetal and aluminum wall and ceiling linings are faced with vinyl, the plywood floor is covered with Dexolium, and body is insulated throughout with Ultralite. Heating is provided through Vapor finned radiators.

Built to operate on third-rail or diesel power, the "Roger Williams" has the highest horsepower per pound rating of any of the self-propelled lightweights

THE ROGER WILLIAMS is the most recent development in the field of lightweight, high-speed passenger trains. Built by the Budd Company for the New York, New Haven & Hartford, it is a high-speed, six-car train, consisting of two streamlined head-end units with cab control stations, and four intermediate coach units. The train may be driven by two 300-hp diesel engines on each car or from the 600-volt, third-rail by two 100-hp electric motors on each car.

The car structures are of stainless steel, light weight construction, with conventional length and floor height. The low roof accommodates an engine cooling fan and radiator enclosure and overall the train is 6 in. lower than the standard RDC. Each unit is a complete powered operating unit, with identical equipment arrangements, except for controls. Duplicate electric and diesel propulsion and Safety Genemotors are in-

Summary of a paper presented by J. E. Burton, of The Budd Company, at the Winter General Meeting of the American Institute of Electrical Engineers, held in New York, January 21-25, 1957.



A-unit car seats 60 passengers and has food service area. Intermediate cars seat 76 passengers. Seats are spaced on 40-in. centers. All cars are 85 ft long. Morton vestibules provide protected passage between cars and controls are carried through Joy trainline jumpers.

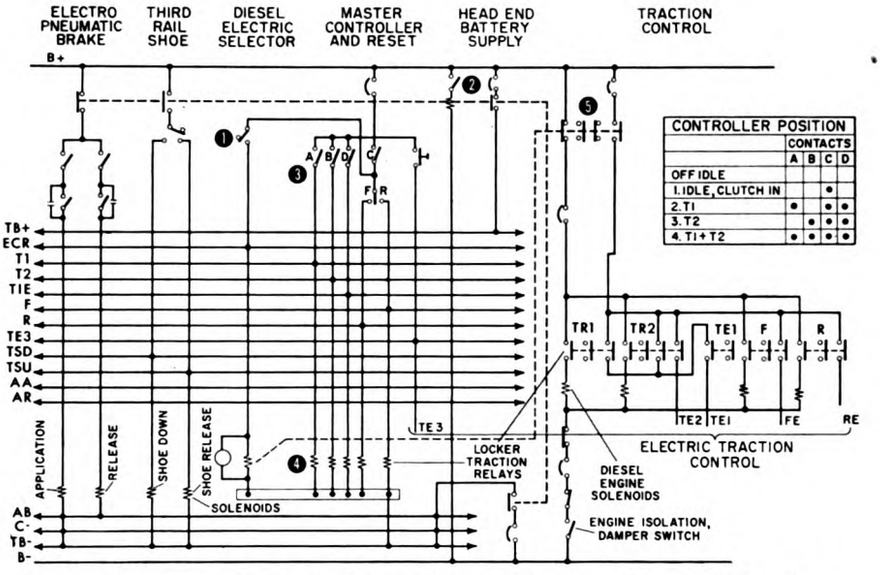
Electrical Aspects of the New Haven's Budd Dual-Powered Train

stalled underfloor at each end of each car.

Diesel power plant assemblies are mounted underfloor in a protective casing and are readily removable. Each power plant consists of a General Motors six-cylinder engine, rated 300 hp at 2,000 rpm, and a combined torque converter reverser gear assembly with torque multiplication of 3.6:1. The output shaft drives a gear unit of 1.8:1 ratio, mounted on the inboard axel of the truck. A splined universal joint shaft compensates for truck motion. All engine, transmission, and protective controls are self contained.

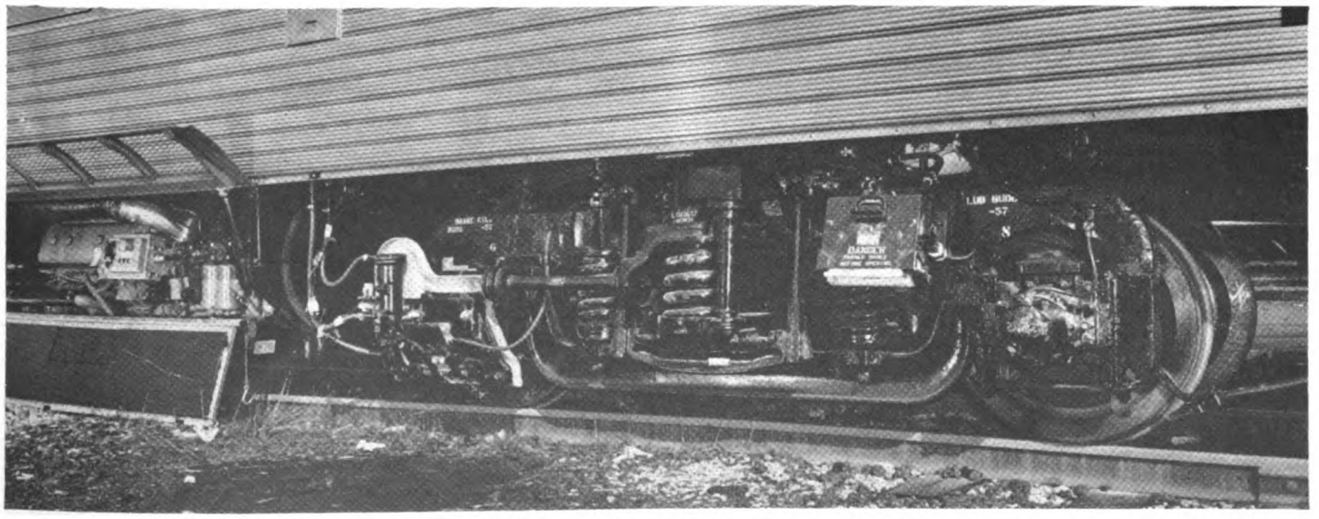
Electric propulsion motor gear box assemblies are nose supported on the outboard axle of each truck, and have integral supports for the disc brake and the motor to transom support rods. The General Electric motors are series-wound for 300 volts and rated 100 hp at the one-hour rating. The motors are series-connected for 600 volts and equipped with special brushes for commutator protection during extended diesel operation. The gear box ratio is 2.72:1 and it contains a ground brush and ring for journal bearing protection.

Diesel performance provides 9.0 hp/ton, based on 100 per cent of output shaft power available for traction, and 62.5 tons average light weight of cars. Initial acceleration is 1.18 mph/sec. The train accelerates from 0 to 65 mph in 2 minutes and requires only 60 per cent of power at 100 mph.

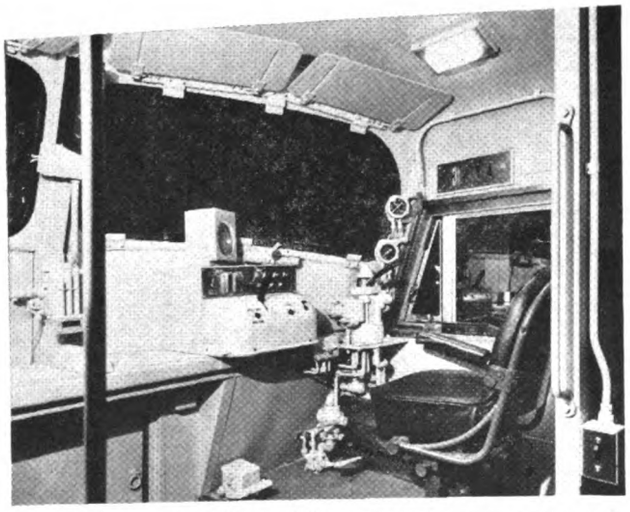


Basic head-end trainline control circuits include the following: (1) controller for diesel or electric operation, (2) isolation contactor which interrupts negative battery to all trainlined circuits, (3) selector switch for diesel or electric operation, (4) individual relays, (5) diesel engine relays.

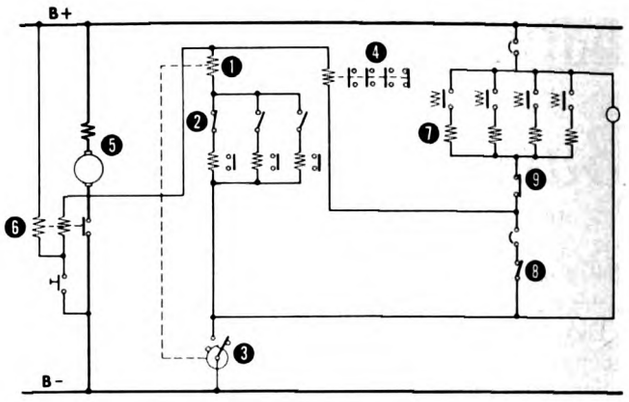
Electric performance provides 5.0 hp/ton based on short time overload rating and 62.5 tons average light weight of cars. Initial acceleration is 0.6 mph/sec. The train accelerates from 0 to 47 mph in 2 minutes and balancing speed on level track is 58 mph.



GM diesel (left) drives inboard axle of truck on which is mounted the third-rail collector shoe. Electric traction motor drives the outboard axle (right). Fluting on car sides is variation from standard Budd design. Underbody equipment is covered with deep expanded-metal skirts.



Engineman's control on "Roger Williams" includes components standard on all RDC cars, and in addition provides for operation of the train while it is being driven by the electric traction motors.



Basic engine control circuits include (1) air damper shut down solenoid, (2) pressure and temperature protective switches, (3) air damper shut down limit switch, (4) engine indicating and control relay, (5) starting motor, (6) Pull in—hold in starting contactor, (7) engine and transmission operating solenoid, (8) locker engine isolation switch, (9) Remote shut down relay isolation control.

The auxiliary Genemotors are capable of supporting full standby air conditioning and light load when motor driven. When engine-driven, they are capable of supporting emergency single-engine operating loads, by reduction of air conditioning or cab heat load. The two Genemotors on each car supply the same load bus, and no provision has been found necessary for balancing the load between the two machines.

Calculated fuel consumption for round trip operation between New York and Boston, including 12 stops and 2½ hours of idling, is 190 gal per car or 2.6 miles per gal per car. Fuel tank capacity of 280 gal is provided.

Head-End Cars

The head-end cars have a large control cab station, a forward equipment compartment, and a coach section seating 60 passengers. The intermediate cars accommodate 76 passengers.

Arrangement of the electric locker, air conditioning plenum, and women's toilets at the No. 1 end of both car types allows identical equipment and wiring and underfloor installation, except in the cab.

An electric locker of the walk-in type with built in switch locker, centralizes all car controls and protection, and affords access from the aisle at the vestibule end. Switching for lighting, air conditioning or heat control, and engine start and stop, as well as cutout or traction, Genemotor, and immersion heaters, is included. Pilot light indication for air conditioning, generator, and diesel engines is visible from the aisle.

Coach fluorescent lighting, arranged for non-thermal starters and unregulated voltage, is installed along each side of continuous multivent air distributors at the center of the ceiling. Individual, Safety aperture type, reading lights are directed to each rotating reclining seat position.

The engineer's control station is equipped with Westinghouse M38C electro-pneumatic brake valve, a controller for electric or diesel traction; a switch panel for electric or diesel selection, third rail shoe control, electro-pneumatic cutout, No. 1 engine start, No. 2 engine start and engine stop; and a foot-operated acknowledging switch. Pilot light indication of electric traction, all engines run, and all engines stop is repeated at the firemen's station. A separate switch panel is located over the engineer's and fireman's window for control lights, signal buzzer, and electrically conductive film heated, windshield defrosters. Electric cab heaters are arranged for hi-low heat positions and reduced to low heat with loss of either generator.

Cab signal and air brake equipment is installed on structural bulkheads in front of the engineer's and fireman's station.

Trainline receptacles for a Joy 12- and a 16-wire removable, moulded jumper assembly are installed on each side of the coupler on the pilot and at each side of the coupler of all car ends for turn-around connection and use of the RDC 12-wire jumper for emergency control.

Basic equipment and control is based on experience with RDC's in all types of service, and includes 40 RDC's on the New Haven in single and multiple operation up to five units.

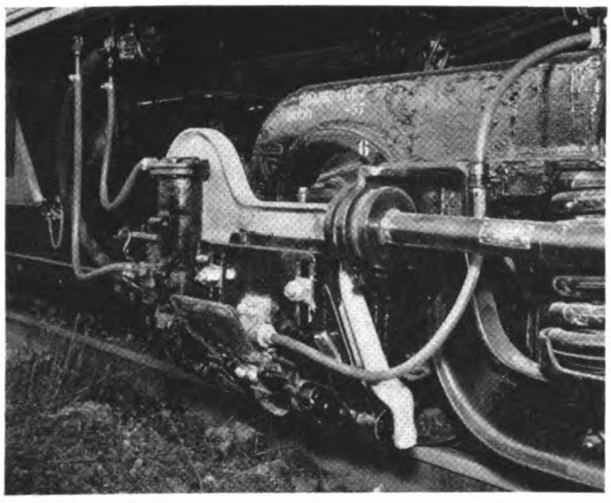
RDC equipment with modification for higher speed requires a minimum of new spare parts, procedures, and maintenance requirements. It also makes possible the use of an RDC for emergency control of the Roger Williams with automatic brake and at speeds up to 85 mph.

All Roger Williams facilities, except electric traction equipment, can be incorporated in an RDC to allow full use as a diesel-powered control unit or coach, since RDC power plants can be kit modified to include the new features.

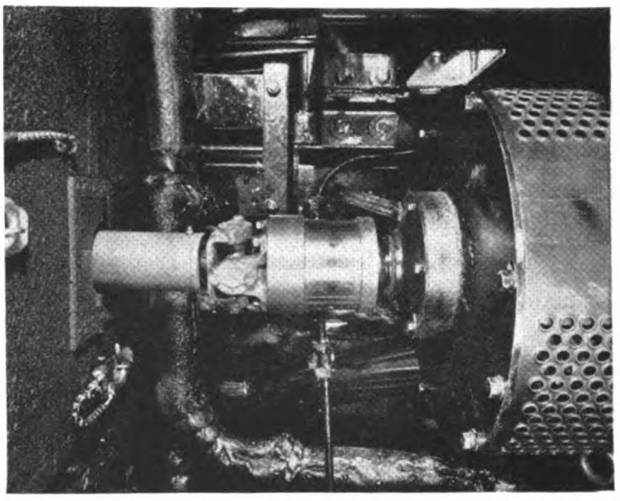
Electric traction controls and accelerating resistors are mounted opposite the No. 2 engine. The controls are of the subway transportation type with a motor driven controller. The line breaker is separately mounted adjacent to the line switch.

Flashboards on the third rail shoe mounts are specially designed of fiberglas reinforced polyester construction, and provide long leakage paths. They resiliently support the third rail shoe mechanism from one journal box on each truck except that no shoe is installed under the cab door and two shoes are installed at the opposite truck.

Auxiliary Genemotors are ar-



Third rail shoe assembly is mounted on inboard axle of General Steel Castings truck. Truck has SKF roller bearings, Standard Steel wheels and axles, Alco springs, and Fabreeka sound-deadening pads.



View from pit under the car shows the flexible drive from the RDC engine (left) to Safety genemotor (right). Genemotor is driven by 600-v d-c motor when on third rail.

ranged for clutch drive from the engine front crankshaft or motor drive from the third rail supply. Each Safety Genemotor is rated 22½ kw when motor-driven and 20 kw when engine-driven. Special brushes are installed to protect the motor commutator during diesel operation.

Genemotor starting panels are located underfloor in one cabinet. In the same cabinet are circuit breakers for line protection. The control provides for low voltage cutout protection, one step unloaded starting, one step speed regulation and transfer from 22½ kw to 20 kw setting when engine-driven.

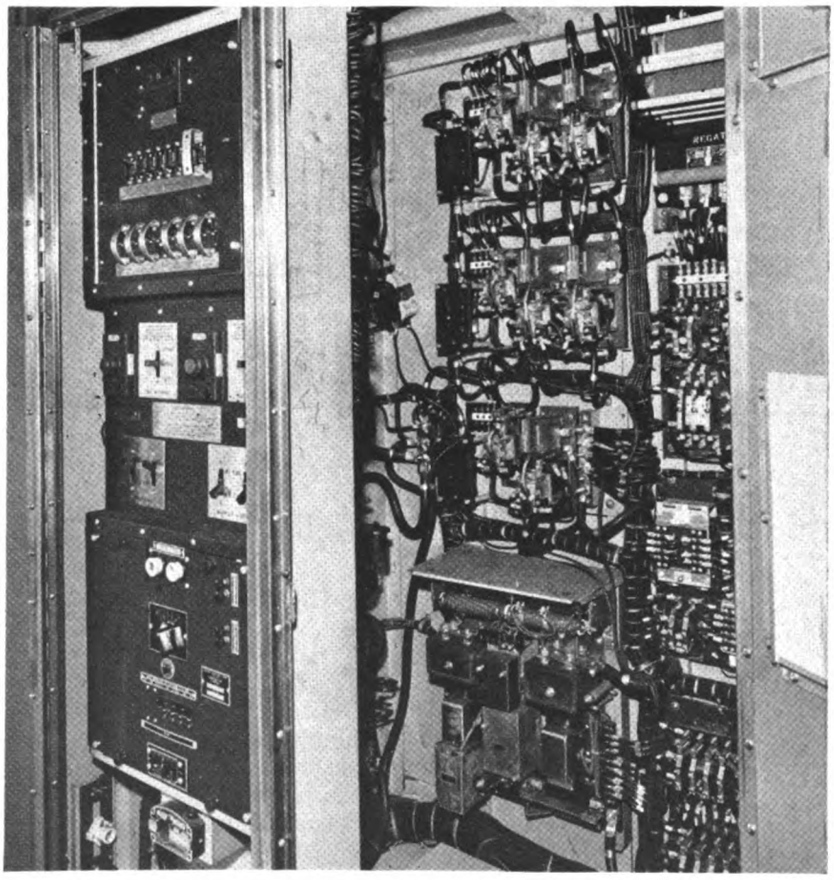
Electric Westinghouse Electric immersion heaters for 600-volt operation are installed in each engine water tank and thermostatically controlled to maintain the engines at operating temperature and supply hot water heat when the diesels are shutdown. Each heater is rated 25 kw.

Antifreeze protection and charging facilities during standby operation include (1) steam couplers and d-c charging receptacles; (2) Safety Genemotor and immersion heater; (3) idled engine and generator, when necessary.

Engine starting is enhanced by (1) low cranking current due to maintaining engines at operating temperature (2) availability of generator when the second engine is cranked (3) availability of 600-volt Genemotors in third rail territory.

Third rail power circuits are confined underfloor and only 64-volt control is extended to the car body. Open wiring is used for traction, generator, and battery cable of 1,000-volt neoprene-jacketed construction, to achieve maximum rating and adaptability to the space underfloor. Open wiring is supported and protected by special moulded Hy-car bushings secured by strap clamps.

Basic engine control circuits operate on 64-volt unregulated supply and comprise starting, protective shutdown, fuel shutdown, indication and interlock, and clutch and throttle setting.



Electrical controls are centralized in walk-in type locker shown at right, and in the built-in switch locker left. Both open into passageway at the vestibule end of each car.

Starting is accomplished by a pull-in-hold-in solenoid contactor which closes the starter motor negative circuit, nullifies B to the air damper shutdown solenoid and, by linkage, closes the air damper shutdown limit switch and, holds the air damper open.

When lube oil reaches 12 psi, the protective low oil pressure switch opens, and the air damper remains latched open. When oil pressure reaches 17 psi, the contactor hold-in circuit is interrupted and the contactor opens the starter motor circuit.

Protective shutdown is accomplished by an air damper solenoid which is linked to the spring loaded latch which holds the damper open. During normal operation, the protective switches are open and the air damper is latched open. When any protective switch closes, it trips the air damper closed, and opens the limit switch to de-energize all controls. Overspeed causes vents to open in the oil supply of the low oil protective switch and causes engine shutdown.

Since the positive supply for the air damper solenoid is taken through the starting motor, the solenoid is de-energized during starting. It is this action which avoids tripping the damper latch before the lube oil switch opens to maintain the solenoid de-energized.

Tell-tale indication of protective shutdown is registered by inserting a series relay in each of the protective switch circuits, and arranging a seal-in circuit to maintain pilot light indication of the circuit energized. A reset button is provided.

Cab indication of all diesels run, all diesels stop, and interlock of immersion heaters and air compressor control, is achieved by a relay connected across the air damper solenoid and protective switch circuit. All diesels run indication is obtained by a pilot light connected in series with a normally open contact on each engine relay. All diesels stop indication is achieved by a pilot light connected to a trainline wire which, is energized by a normally open contact on each engine relay so that the pilot light is extinguished only when the last engine is shut down.

Isolation of traction solenoids is effected by interrupting the common negative battery circuit. An isolation switch is provided in the car lockers.

Fuel shutdown is controlled by energizing a solenoid to hold injector racks in the fuel-off position until the engine stalls and low oil pressure shutdown occurs to de-energize all controls and close the air damper. A limit switch on the fuel shutdown solenoid linkage prevents false low oil shutdown indication.

Basic head-end trainline control circuits comprise traction, electro-pneumatic brake, third rail shoe, reset, diesel-electric selection, cab start and stop engines, and head-end battery supply to auxiliary control circuits.

All trainline circuits are supplied from the control station car battery, to avoid paralleling of batteries, and assure isolation of circuits when leaving the control station. In general, the trainline circuit operates a relay device in each car to apply local car battery to the function selected.

The controller is arranged for compatible operation for either electric or diesel control, by omission of electric traction circuits in the No. 1 idle position which is normally used for station stop and braking, to avoid unnecessary disengagement of clutches, or application of brakes against the motors.

Electric to diesel changeover is accomplished on the run by the following procedure: (1) cab start No. 1 and No. 2 engines while in electric position; (2) return controller to No. 1 idle position; (3) reduce train speed below 50 mph (below direct drive speed); (4) switch from electric to diesel and wait for clutches to engage; (5) proceed with normal diesel operation. Changeover from diesel to electric may be accomplished at any speed and followed by cab shutdown of idled engines. Locker starting of engines follows similar procedure.

From the Diesel Maintainer's Note Book

Trouble—Right in Their Hands

By Gordon Taylor

A GP-7 LOCOMOTIVE had just received an annual inspection. The engine had been carefully checked and it was found necessary to renew two cylinder and piston assemblies because of the condition of the rings and gaskets.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

After the repairs were completed, the engine was barred over by hand operation with an engine turning jack. It was found that the engine was difficult to turn, as if there were excessive friction in the engine.

It seemed as if there were certain spots in the rotation of engine where it was more difficult to turn than at other positions.

The maintainers were very careful men and did not intend to release an engine with a binding condition. They promptly set to work to dis-

cover the cause of the trouble. They very naturally supposed there might be something wrong with the new work that had been built into the engine while undergoing repairs.

A close inspection revealed no defects that would account for a binding condition. Since it was growing late and it was time for the men to check out, it was decided to defer further efforts until next morning.

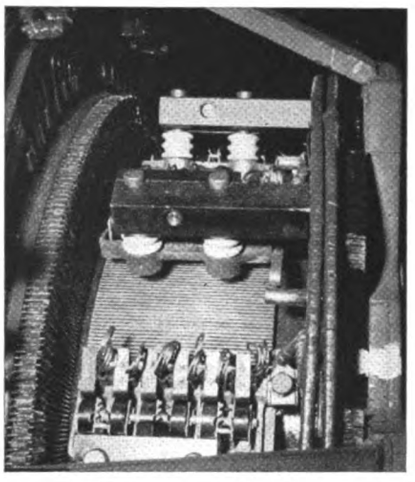
The next day some time was spent in further search of the trouble. Finally someone suggested barring over another engine close by to get a comparison of turning effort. Using the same engine turning jack, it was found that the second engine was also difficult to bar over.

The next step was to try another turning jack, and it was then found that both engines could easily be barred over. The trouble turned out to be a defective engine turning jack. The cause of the trouble was right in the hands of the maintainers while they were looking for the trouble in the engine.

In defense of the men who experienced this trouble, it should be said that they were right on the job trying to locate the cause. They are to be commended for not taking the easy course of just letting the engine go in the hope that there was nothing wrong with it. As long as maintainers continue that careful attitude, they will keep the diesels out of serious trouble.

How Much Do You Know About Brushes

How Do Rubbing Speed and Spring Pressure Affect Brush Performance?



TO A LIMITED EXTENT, the effects of rubbing speed and spring pressure on brush performance are interdependent. All brushes have a maximum efficient operating rubbing speed limitation, other conditions remaining constant. This maximum will vary, for a given grade, with any change in the operating conditions. Spring pressure is one of these conditions. Temperature, current density, and atmospheric conditions are other variables.

When the maximum rubbing speed at the given conditions is exceeded, the result may be (1) short brush life, sometimes called dusting, (2) poor commutation as evidenced by heavy sparking and burned commutator bars, and (3) high brush friction attended by film stripping. In all fairness, it must be agreed that the first two of these difficulties may also be tied in with the riding characteristics of the brush. Spring pressure plays its part in that the brush riding characteristics and the contact-drop level can be changed by changing the pressure.

A brush grade may have been doing a good job under present conditions but if the conditions are changed for operating reasons the brush may get into trouble. For instance, let us assume that grade X has a nominal maximum rubbing speed of 9,000 ft per minute, roughly equivalent to the conditions obtained on a motor at 65 mph with a 65-mph gear ratio in use. Assume now that it is found desirable to operate these units at 75 mph. Unless this speed obtains for only short distances, the brush grade will certainly be in trouble. At 75 mph, the rubbing speed will have been increased to approximately 11,000 ft per minute. Changing the spring pressure would not be indicated in this case. Two recourses would be: (1) assuming the motor will withstand the increased speed, change to a brush grade capable of operating under the higher speed, or (2) change the gear ratio to keep the commutator speed at the same 9,000 ft per minute rubbing speed at 75 mph.

Brush spring pressure of itself, for a given type of traction motor, has a rather wide range in which satisfactory operation can be obtained. The range is much less for generators. However, long experience by the electrical and brush manufacturers has developed certain optimum ranges. These should be strictly observed unless some peculiarity of operating conditions is found to create a specific case where the need for a change in brush spring pressure is indicated. On diesel locomotives, the specified ranges are normally adequate to handle all operating conditions. If the spring pressure is too high, it will result in (1) commutator wear, (2) reduced brush life, and (3) film stripping because of excessive brush friction. If the pressure is too low, it will result in (1) poor brush riding, (2) adverse commutator condition, and (3) flashovers due to brushes bouncing and propagating the flash from ring-fire.

It should be kept in mind that approval of a given brush grade for use on a machine has been based on test results which were obtained under standardized spring pressure conditions. Tampering with the specified brush spring pressure should not be accepted as a means of improving brush performance until it has been definitely established that the problem is not arising from the use of an inadequate brush grade.

BY K. R. MATZ
National Carbon Company

This is the third of a series of questions and answers which are appearing each month.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F536-Q—What other braking medium is available during dynamic braking?
A—The independent brake is always available.

F537-Q—Even though it is available, should the independent brake be used during dynamic braking?
A—The independent air should always be kept released during dynamic braking, or the wheels may slide.

F538-Q—May the automatic brake be used on the train during dynamic braking?
A—Yes

F539-Q—If a unit is isolated so that it's dynamic brake is inoperative while the rest of the locomotive is in dynamic braking, will the automatic brakes on that unit apply?
A—The automatic brake on the isolated unit will not apply.

F540-Q—Explain the reason.
A—The dynamic interlock on that unit, even though isolated, remains energized as long as the engineer is operating in dynamic braking.

F541-Q—What causes the dynamic interlock to be energized?
A—The dynamic interlocks on all units are energized by the engineer's selector handle.

F542-Q—In the event of a brake valve initiated emergency brake applications, how is the operation of dynamic braking affected?
A—The dynamic brake is automatically nullified and the locomotive automatic brakes will apply.

F543-Q—What must be done to recapture the dynamic brake?
A—The selector handle must be returned to the *No. 1* position and then to *off.*

F544-Q—How is braking effort affected as speed decreases?
A—As the speed decreases, braking effort builds up to a maximum near the locomotive continuous speed and then decreases at a sharp rate.

F545-Q—At what speed is dynamic brake still effective?
A—There is still considerable braking left at 10 mph, and often this is more effective than the independent brake.

F546-Q—What performances may not be expected of the dynamic brake?
A—It must not be expected to stop heavy trains in short distances or to slow trains down on heavy grades.

F547-Q—At low speeds, does the dynamic braking effort fall?
A—Yes, the dynamic braking effort decreases sharply.

Bulletin 1706, Sec. 110-A, Page 3.

F548-Q—What should be done when speed is around 5 mph?
A—Release the dynamic brake by moving the selector lever to *No. 1* position and applying the independent brake to keep the slack from running out.

Manipulating Dynamic Brake on Level Track

F549-Q—What happens when maximum braking slows the train?
A—The ammeter pointer falls back as train speed drops.

F550-Q—What must be done to maintain the maximum braking?
A—The selector lever (handle) must be moved to the right to keep the pointer at the upper end of the white zone.

F551-Q—What manner of manipulation should be employed if a steady speed is desired, rather than a slow down?
A—Ease off by moving the handle to the left until the required speed is reached.

F552-Q—How can the speed be held?
A—To hold this speed, move the handle forward to retard or back to accelerate.

F553-Q—Is the dynamic brake intended for use in bringing the train to a stop?
A—No.

F554-Q—What would you say as to the general use of the dynamic brake?
A—If the distance available for the stop is sufficient, and it is desired to avoid an automatic air application for some particular reason, the train may be slowed down gradually with the dynamic brake.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

Pamphlet 5046-15 Page 41

W218-Q—How long do the movable parts of the distributing valve remain in the position shown?
A—Until brake cylinder pressure slightly exceeds application cylinder pressure, when the application piston and application valve move back to *Lap.*

W219-Q—How is release after emergency brought about?
A—By the same manipulation of the automatic brake valve as that following service application and is explained under "Release and Recharge".

W220-Q—What should be done following an emergency application from an emergency brake valve, burst hose or parting of the train?
A—The handle of the automatic brake valve should immediately be moved to *Lap* position to prevent a loss of main reservoir pressure.

Independent Brake Operation

W221-Q—How can the air pressure in application be controlled?

Spring Hinges and Adjustable Locks

ADAPTABLE TO ALL DROP BOTTOM GONDOLAS

Wine Drop Bottom Locks and Spring Hinges have long been established as the practical method for drop bottom closure. Basic simplicity and ruggedness of the mechanism requires little or no servicing, and the accesible method of adjustment on the individual lock assures positive door fit.

Featuring single door operation, any or all doors open as required to control lading distribution. Maintenance-wise, a single door and mechanism may be dismantled without disturbing adjacent doors. The Wine Drop Bottom Combination offers all the important improvements — individual door fit, minimum maintenance, and easy, one man selective operation.

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

QUESTIONS AND ANSWERS

A—This pressure may be controlled indirectly by the automatic portion of the brake valve or directly by the independent portion of the brake valve.

W222-Q—What must be considered when using the independent portion of the brake valve?
A—Although the equalizing portion of the distributing valve can be disregarded, the application piston must be considered as being moved by the air in the application cylinder, controlled directly by the independent portion of the brake valve.

Running Position (Plate 1)

W223-Q—When is Running position of the independent brake valve used?
A—This is the position in which the handle of the independent brake valve should be carried at all times when the independent brake is not in use.

W224-Q—What ports in the independent brake valve are connected in the Running position?
A—Exhaust valve *134* is open, connecting ports *19* and *4*.

W225-Q—What communications are established?
A—Communication is established through the distributing valve release pipe, between the application cylinder and *EX* of the automatic brake valve.

W226-Q—How are the locomotive brake cylinders connected at this time?
A—The brake cylinder pipe is open to atmosphere through ports *c*, *d* and *e* in the distributing valve.

Application, First Stage (Plate 6)

W227-Q—How is an independent application of the brakes obtained?
A—The independent brake valve handle is moved to the right, the farther the movement the greater the amount of application.

W228-Q—What action takes place as the handle is moved to the right?
A—The cam on shaft *76* moves dog *144*, pusher pin *139*, and attached levers, the ends of which are positioned on inlet valve *122* and exhaust valve *134*.

Pamphlet 5046-15 (Page 42)

W229-Q—In view of the above, what is accomplished by the first movement of the handle cam?
A—The first movement of the handle cam causes the exhaust valve to close, cutting off the brake valve exhaust.

W230-Q—What takes place with further brake valve handle movement?
A—Further movement of the brake valve handle to the right causes additional movement of the balancing levers, which now pivot on the closed exhaust valve, and open the inlet valve.

W231-Q—What flow of air now takes place at the brake valve?
A—Main reservoir air flows from passage *7* into brake valve chamber *F*, supplying application air past check valve *97b* and through passage *2* to the application cylinder pipe. At the same time, application air flows from chamber *F* to passage *4* and the distributing valve release pipe.

W232-Q—Describe the flow of air at the distributing valve.
A—Air from the application cylinder pipe *2* flows through passage *2* to the application cylinder and through cavity *k* and port *w* to the application chamber. Air from the distributing valve release pipe flows through passage *4* and cavity *k* in the equalizing slide valve to port *w* and the application chamber.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Setting PC Switch.

G606-Q—What power and speed is available if the PC switch is tripped?
A—Locomotive will have power in the number one throttle position (shown on load indicating meter) but engine speed will not advance as the throttle is opened.

G607-Q—Will the fuel pumps continue to operate?
A—No, the fuel pumps will be stopped.

Manual 2310, Page 226.

G608-Q—What would be the situation in No. 5 or 6 throttle position?
A—The engines will stop; no bells will ring.

G609-Q—What will cause the same trouble as a tripped PC switch?
A—A condition in which the fuel pump switch in the cab is out, and the fuel pump fuse in the distribution panel is blown.

Ground Relay

G610-Q—How does the pointer indicate the position of the ground relay?
A—The pointer points to a yellow dot when set, and to a red dot when tripped.

G611-Q—What are the conditions when the ground relay is tripped?
A—The engine will not speed up when throttle is opened, and in *No. 5* or *6* position of throttle the engine will stop and the blue lights will light.

G612-Q—What must be done to reset the ground relay?
A—To reset: isolate the engine, reset the relay and put the engine on the line.

G613-Q—What should be done if relay continues to trip?
A—Isolate the unit. (See Article 316 in the manual).

Wheel Slip Control

G614-Q—What happens if wheel slipping occurs?
A—The wheel slip control, located in the electrical control cabinet behind the power contactors, will operate.

G615-Q—What is the indication of a wheel slip?
A—The wheel slip indicator on the engineer's instrument panel will light.

G616-Q—What does wheel slip action accomplish?
A—It automatically reduces the power output of the main generator, which in turn reduces traction motor torque, stopping the slipping.

G617-Q—Is it generally necessary to reduce the throttle when momentary wheel slip action occurs?
A—No.

G618-Q—Explain the reason.
A—The locomotive will automatically reduce its power to stop the slipping.

NEW ESSO ARAPEN GEAR LUBRICANT GIVES TRACTION MOTOR GEARS DEPENDABLE LUBRICATION FOR OVER SIX MONTHS

...WITHOUT GREASE ADDITION!

Arapen Gear Lubricant—an important new traction motor gear lubricant developed by Esso Research—is now available to *you*. But before going on the market, this remarkable new product was thoroughly tested in the lab and *on the road*.

On the New York Central . . . Arapen Gear Lubricant was tested for 18 months in regular diesel freight service. The test proved the feasibility of six months' operation without additional lubrication.

NEW YORK CENTRAL SYSTEM

Performance Advantages of ARAPEN GEAR LUBRICANT:

ANTI-LEAKAGE CHARACTERISTICS: maintains consistency through full range of operating temperatures, resulting in a minimum of drippage on ties, pits and station platforms.

EXCELLENT OXIDATION STABILITY: permits extended operation without hardening.

EXCELLENT STRUCTURE STABILITY: minimizes failures due to dry gears because of excessive gear case leakage.

EXCELLENT WEAR CHARACTERISTICS: provides proper lubrication throughout life of gears.

For complete information and technical assistance in the use of new Esso Arapen Gear Lubricant, call your local Esso office or write: Esso Standard Oil Co., Railroad Sales Div., 15 W. 51st Street, New York 19, N. Y.

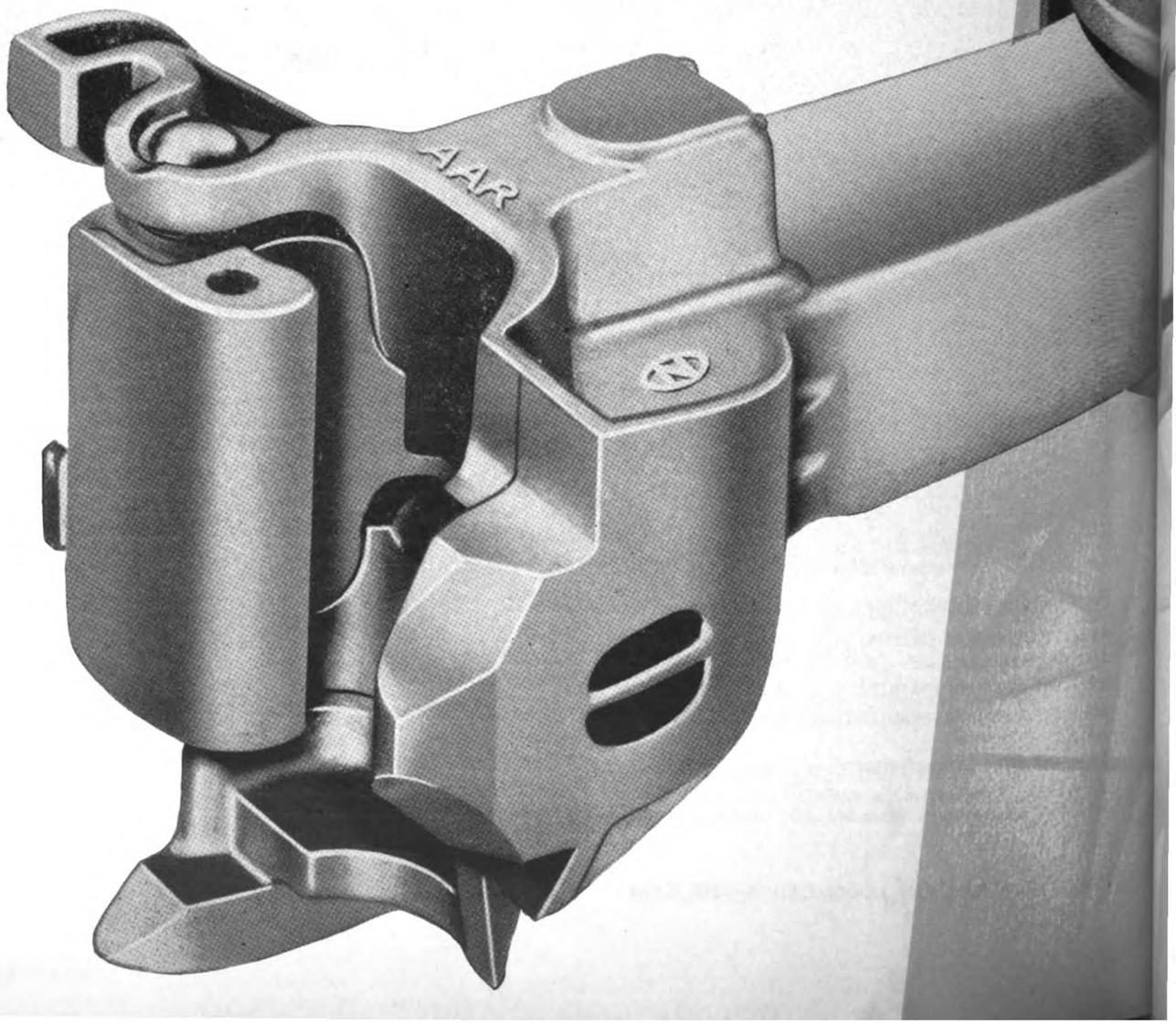
Esso

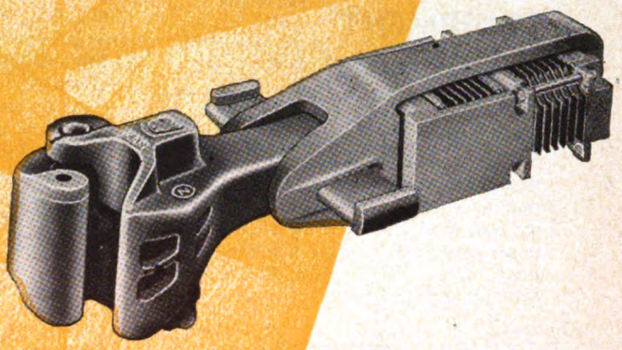
RAILROAD PRODUCTS

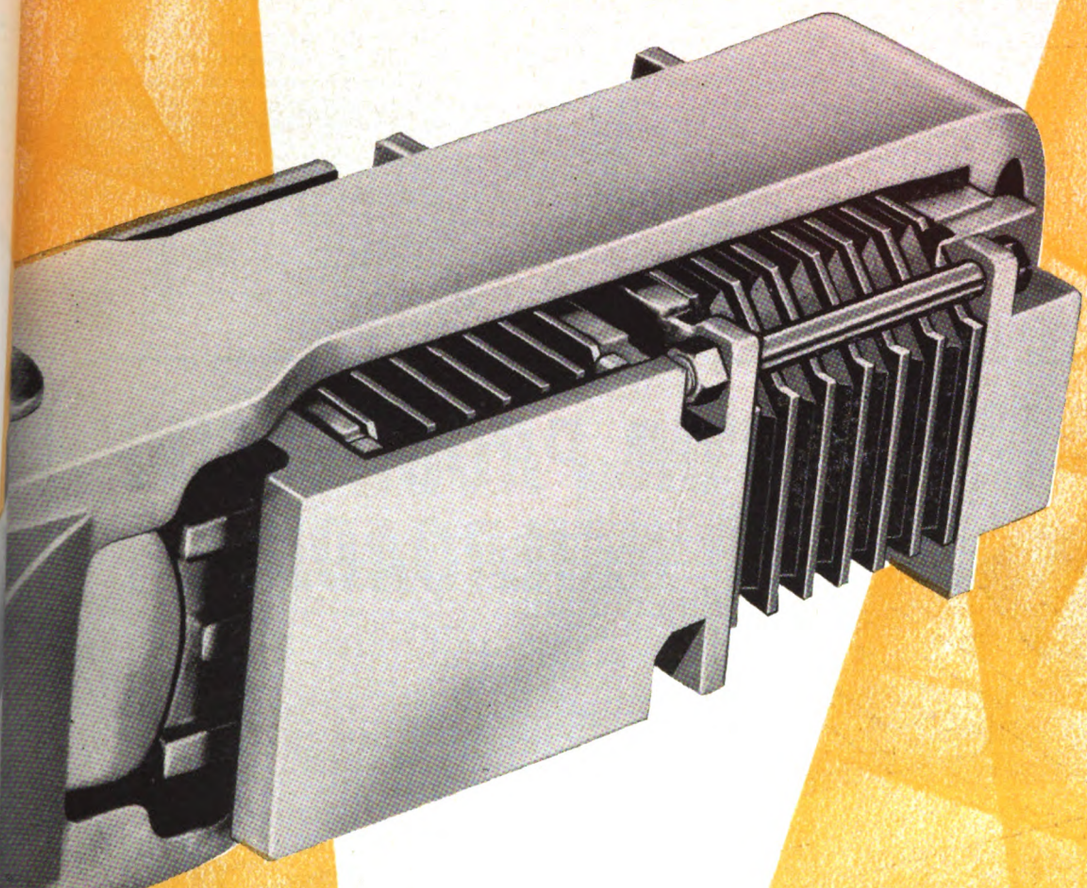
There's Improved Railroading with National Specialties

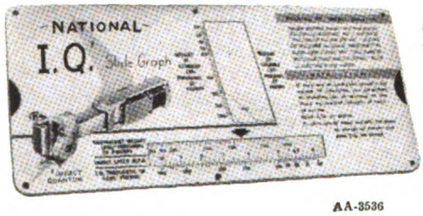
REASON:

National's MF-400 Rubber-Cushioned Draft Gears have a rated capacity of 42,500 foot pounds, *plus* a reserve capacity 54 per cent greater than the rated — *65,500 foot-pounds!* This reserve capacity guarantees the original rated capacity at the original force level over a longer period of time than possible with gears that have definite solid points at their rated travel.









AA-3536

NATIONAL'S IQ SLIDE GRAPH

(Available upon request)

Shows total work done in foot-pounds during impacts between various cars at various speeds! Shows how much of this work National Draft Gears account for at various force levels! Points up need for high capacity in draft gears!

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868 ***Cleveland 6, Ohio***

COUPLERS
YOKES
DRAFT GEARS
FREIGHT TRUCKS
SNUBBER PACKAGES

GEARED TO PROGRESS
P R I
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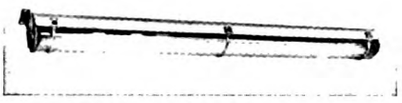
EQUIPMENT

(*Continued from page 16*)

It is applied conventionally and is used either with a normal drying before coating with plastisol, or a pre-bake with the primer. The resulting bond is intended to withstand any tooling operation in addition to extremes of temperature, humidity, and most mild acid or alkaline solutions. *Dept. NS, Compo Chemical Company, Dept. RLC, 125 Roberts Rd., Waltham 54, Mass.*



Fluorescent Lighting

A fluorescent luminaire designed specifically for tunnel and underpass lighting is now available. Named Form 106U, the 6-ft, single-lamp unit is designed to produce adequate lateral illumination for sidewalls and ceilings as well as to effectively direct the desired amount of light on the roadway.

It has a one-piece extruded acrylic plastic globe that has been scalloped to provide the proper diffusion of light. Both the globe and the alzak aluminum reflector are side-hinged for easy access to lamps, ballasts, and wiring. Spring-loaded sockets provide easy relamping when necessary. An extruded aluminum hood and die-cast aluminum end plates provide for reduced maintenance and easier handling.

The luminaire is equipped with adjustable-angle galvanized steel mounting brackets and resilient gasketing and material between the hood and globe. A choice of lamps,—Slimline 72T8 (300 ma), Slimline 72T12 (600 ma), and Rapid Start F7T12/CW/RS,—is available. Another feature of the unit is economical ballasting which is achieved by the use of luminaires with two-lamp ballasts in conjunction with ballastless luminaires in multiple luminaire installations. *General Electric Company, Dept. RLC, Schenectady 5, N. Y.*

Automatic Power Feed

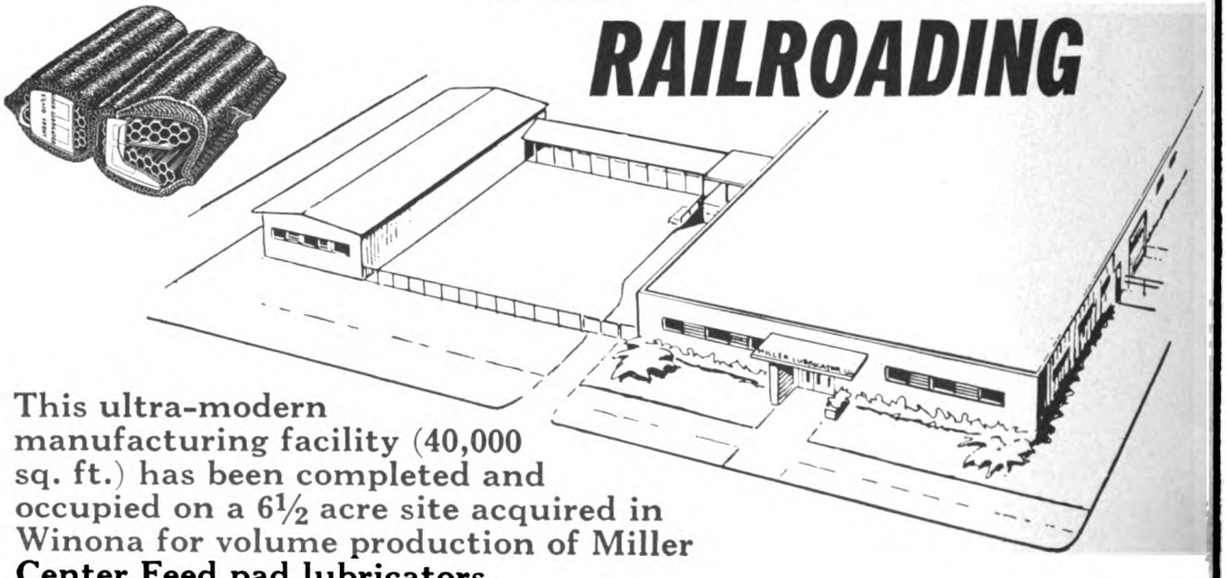
Automatic power feed has been added to the Portomag drill press. It is now possible to take this machine to the job, eliminating waste time and production tie-ups when taking work to a radial drill.

While the electro-magnetic base holds the drill press in position, the new power feed makes it possible for the operator to run the drill point down to the center punch mark, turn on the automatic feed, and let the drill do the work. The power feed can be engaged or disengaged at any time, and the depth of cut per

(*Continued on page 82*)

78,000 CARSETS TO DATE

FOR PROGRESSIVE RAILROADING



This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller **Center Feed pad lubricators.**

Additional production capacity is now on hand to meet every railroad requirement placed with us, regardless of amount.

- *Volume quantities—immediate delivery*
- *Cost—$40 per carset (for all sizes)*
- *Life expectancy—6 years*

MILLER LUBRICATOR CO., WINONA, MINN.

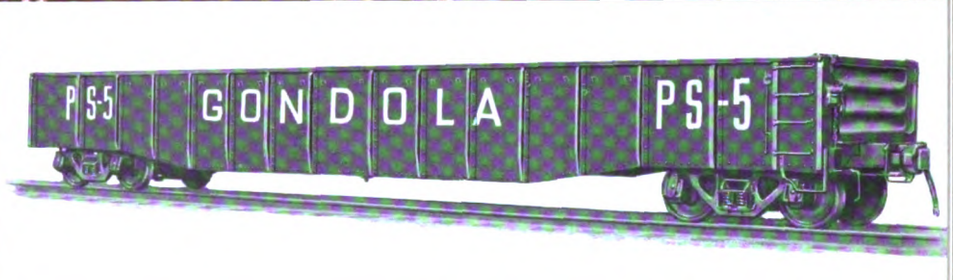
Another addition to full line standardization

the new

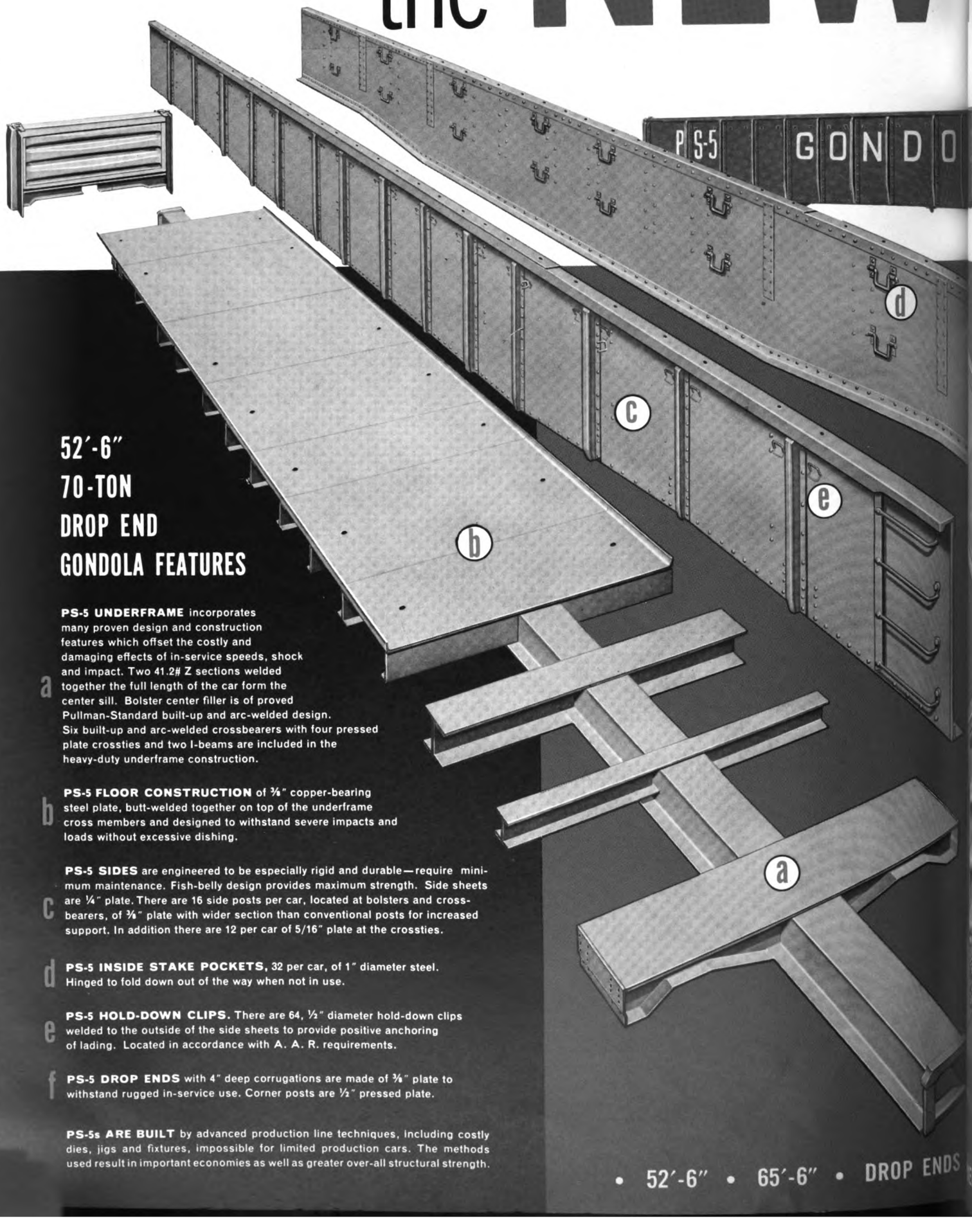
PULLMAN-STANDARD

PS-5

gondola



the NEW



52′-6″ 70-TON DROP END GONDOLA FEATURES

a **PS-5 UNDERFRAME** incorporates many proven design and construction features which offset the costly and damaging effects of in-service speeds, shock and impact. Two 41.2# Z sections welded together the full length of the car form the center sill. Bolster center filler is of proved Pullman-Standard built-up and arc-welded design. Six built-up and arc-welded crossbearers with four pressed plate crossties and two I-beams are included in the heavy-duty underframe construction.

b **PS-5 FLOOR CONSTRUCTION** of ⅜″ copper-bearing steel plate, butt-welded together on top of the underframe cross members and designed to withstand severe impacts and loads without excessive dishing.

c **PS-5 SIDES** are engineered to be especially rigid and durable—require minimum maintenance. Fish-belly design provides maximum strength. Side sheets are ¼″ plate. There are 16 side posts per car, located at bolsters and crossbearers, of ⅜″ plate with wider section than conventional posts for increased support. In addition there are 12 per car of 5/16″ plate at the crossties.

d **PS-5 INSIDE STAKE POCKETS,** 32 per car, of 1″ diameter steel. Hinged to fold down out of the way when not in use.

e **PS-5 HOLD-DOWN CLIPS.** There are 64, ½″ diameter hold-down clips welded to the outside of the side sheets to provide positive anchoring of lading. Located in accordance with A. A. R. requirements.

f **PS-5 DROP ENDS** with 4″ deep corrugations are made of ⅜″ plate to withstand rugged in-service use. Corner posts are ½″ pressed plate.

PS-5s ARE BUILT by advanced production line techniques, including costly dies, jigs and fixtures, impossible for limited production cars. The methods used result in important economies as well as greater over-all structural strength.

• 52′-6″ • 65′-6″ • DROP ENDS

PS-5 GONDOLA

EVOLVED from 8 years' rugged service on the FRISCO *and 3 years on the* Rock Island

Development of the new, standardized PS-5 Gondola resulted from exhaustive design and engineering collaboration between the St. Louis-San Francisco Railroad, the Rock Island and the world's leading carbuilder, Pullman-Standard. This cooperative effort spanned many months . . . existing rolling stock was studied, areas for improvement were probed, the effects of current car handling practices were investigated and potential trouble spots were eliminated. The Pullman-Standard concept of *flexible* standardization was the thread that wove these studies together . . . standardization that would allow Pullman-Standard to apply the economies and quality controls of mass production to the building of these cars while providing sufficient design versatility to meet the varied use requirements of owners and shippers. Finally, a design was developed that would meet the hard in-service demands made on gondolas by the Great American Railway System.

This advanced design was built into four hundred 52′-6″ gondolas which rolled off the production line in 1949 for the Frisco. 1953 saw the first of three hundred 65′-6″ gondolas, built to this same basic design, delivered to the Rock Island. Now eight years of punishing service are behind the Frisco's original lot of gondolas while the Rock Island units are in their fourth year.

This service-proved gondola design has now been further refined through Pullman-Standard's flexible standardization concept, and the gondola, the PS-5, has been added to the Pullman-Standard family of standardized freight cars.

Railroad purchasers of the PS-5 now receive all the plus advantages of Pullman-Standard standardization . . . thoroughly proved design, mass production economies and consistent superior craftsmanship applied through the carbuilding experience and know-how of the world's largest carbuilder.

Complete specifications detailing the new PS-5 standardized gondola are available from your Pullman-Standard representative. Call him—he will be pleased to discuss this new car with you and show you how an investment in the PS-5 means lower first cost, more dependable performance, minimum maintenance and railroad-shipper acceptance.

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY, *Subsidiary of Pullman Incorporated*
221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

PS-5 specifications*

P-S Standardization Provides Flexibility in Basic PS-5 Design

Pullman-Standard's concept of standardization allows sufficient flexibility for P-S engineers to work with buyers in adapting the PS-5 to special requirements. Typical options you may specify:

length Either 52′-6″ or 65′-6″ lengths are available.

sides Side heights can be provided to suit your requirements.

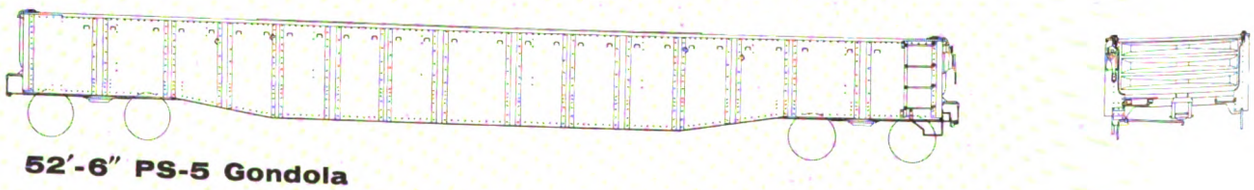
floors PS-5 Standardized Gondolas can be provided with floors of welded steel, P-S Nailable Steel Floor, wood or a composite of wood and steel.

ends Either drop or fixed ends are available on the new PS-5.

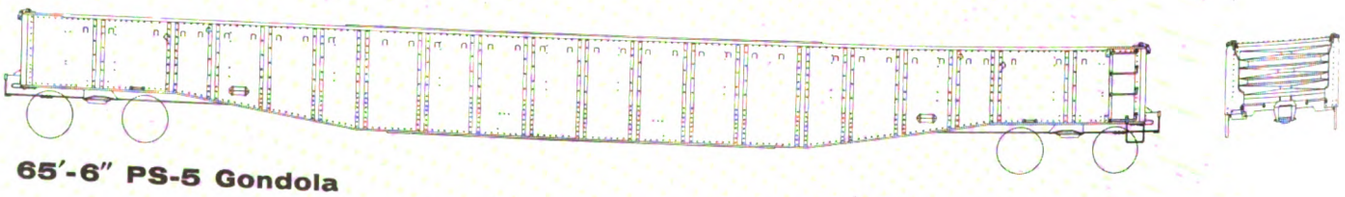
*Specifications subject to change without notice.

General Dimensions

	52′-6″ 70-Ton Drop End Gondola	65′-6″ 70-Ton Mill Type Drop End Gondola
Length inside	52′-6″	65′-6″
Length over strikers	54′-6″	67′-6″
Length between trucks	43′-6″	56′-6″
Width inside	9′-6″	7′-9″
Inside height	3′-6″	3′-6″
Inside stake pockets	Thirty-two collapsible inside stake pockets per car.	Forty collapsible inside stake pockets per car.
Hold-down clips	Sixty-four per car	Eighty per car
Drop ends	Drop ends of ⅜″ plate, Pullman-Standard design with 4″ deep corrugations.	Drop ends of ⅜″ plate, Pullman-Standard design with 4″ deep corrugations.



52′-6″ PS-5 Gondola



65′-6″ PS-5 Gondola

WORLD'S LARGEST CARBUILDER

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

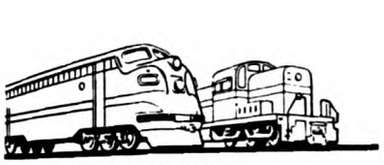
SUBSIDIARY OF PULLMAN INCORPORATED

221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

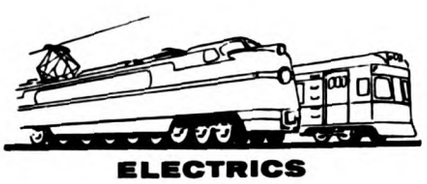
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

GEARED TO PROGRESS P R I MEMBER

Printed in U.S.A.



DIESELS



ELECTRICS

MU CARS

ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

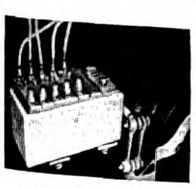
What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.

FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange Lubricators

Safety Valves

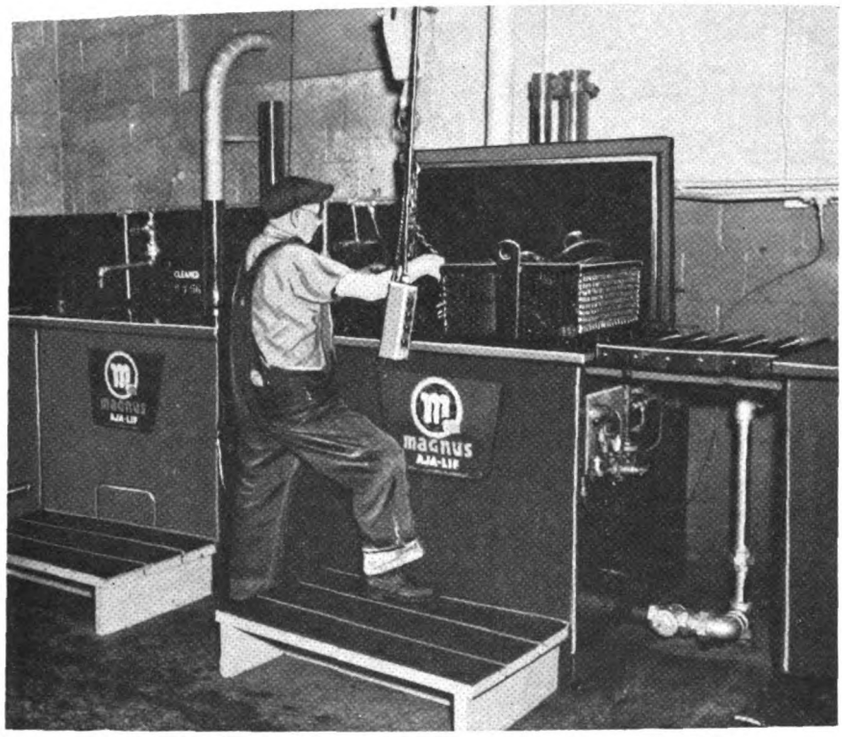
Fuel Tank Sight Gages

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**



A NEW METHOD FOR . . .

PRODUCTION LINE CLEANING OF JOURNAL BOXES & BEARINGS!

One cleaning shop of a major railroad was falling behind in its journal box and bearing cleaning . . .

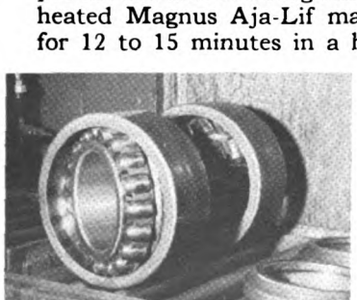
It is now ahead of schedule!

It formerly employed two mechanics and two men handwashing parts . . .

It now employes three mechanics—no hand labor!

THE REASON: A MAGNUS METHOD

With the utilization of Magnus machines, materials and methods, production-line cleaning efficiency was achieved. Boxes go into one heated Magnus Aja-Lif machine and are automatically agitated for 12 to 15 minutes in a heavy duty soap type alkaline cleaner. Bearings go into an unheated Aja-Lif containing Magnus RR-755 with solvent seal, and then, by a roller conveyor to a second unheated Aja-Lif containing safety solvent.



The result: Boxes and bearings are *efficiently* and *thoroughly cleaned.*

For information on how Magnus can bring production-line efficiency to your cleaning, write Magnus, 77 South Avenue, Garwood, New Jersey.

magnus

RAILROAD DIVISION

MAGNUS CHEMICAL CO., INC.

—a world-wide organization specializing in cleaning and protection of all surfaces.

EQUIPMENT

(*Continued from page 76*)

revolution can be set according to the size of drill bit used.

This machine will drill up to 1¼-in. and tap 1-in. holes with accuracy, completely eliminating operator fatigue. *Portomag, Inc., Dept. RLC, 1511 East Nine Mile Road, Ferndale 20, Mich.*

Paint Mixer

The Jiffy Mixer is said to shorten the mixing time and obtain more thorough and smoother paint mixes. It is also said to be a time saver for, among others, aluminum and lead based paints, powders, and latex. Mixing is reported so complete that straining is unnecessary.

It can be rotated by any standard electric or pneumatic portable power tool in any open container without splashing or cutting into the container wall. Air cannot be sucked into the mixture, according to the manufacturers, and being it is not clamped to the container, the operator separates all solids from the sides and bottom by manual movement of the device. *Jiffy Mixer Co. Inc., Dept. RLC, 515 Market st., San Francisco 5.*

High-Temperature Insulating Material

An organic modified-silicone insulation approaching the heat resistant require-

(*Continued on page 86*)

MOTOR WHEEL ANNOUNCES

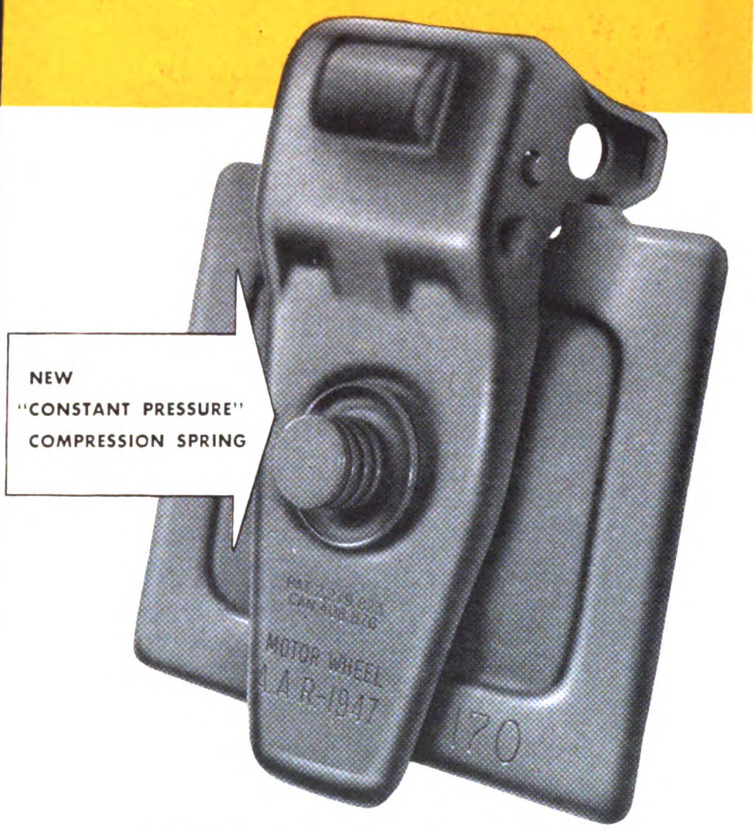
Improved Longer Service
PRESSED STEEL Journal Box Lids

NEW "CONSTANT PRESSURE" COMPRESSION SPRING

- HAS GREATER RANGE OF DEFLECTION
- PROVIDES GREATER SURFACE CONTACT
- INCREASES LID LIFE

Motor Wheel's improved coil spring center construction provides constant pressure over a greater seating surface on the housing. Service tests have proven that this improved assembly increases lid life.

Motor Wheel lids provide 4-way articulation . . . extended housing arms to facilitate raising lid . . . 120° opening for service . . . installation or removal without tools . . . and rugged, pressed steel construction.



Certified by A.A.R. to latest Spec. M-120-47

72

MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN

National Railway Sales Representatives
T-Z RAILWAY EQUIPMENT CO.
G. S. TURNER, *President*
8 South Michigan, Chicago 3, Ill.

Name the load on your road

there's a Yellow Strand® Safety Sling to handle it!

Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

They can be tailor-made to specifically fit your needs. Just ask your Broderick & Bascom distributor, or write direct to us for specific sling information.

Diesel switch engine is safely and easily lifted with four M-1-AB Yellow Strand Braided Slings; each sling is 8 parts ¾" rope, 14 feet long.

Yellow Strand®

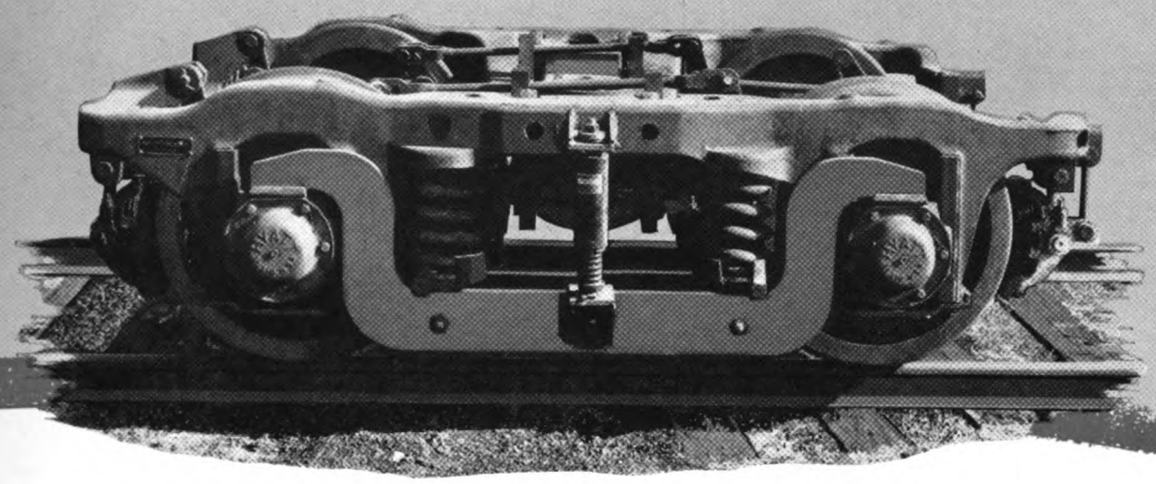
Manufacturers of Wire Rope for over 80 Years

Broderick & Bascom Rope Co.

4203 Union Blvd., St. Louis 15, Mo.

American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.

Repeat Orders Prove Their Value!

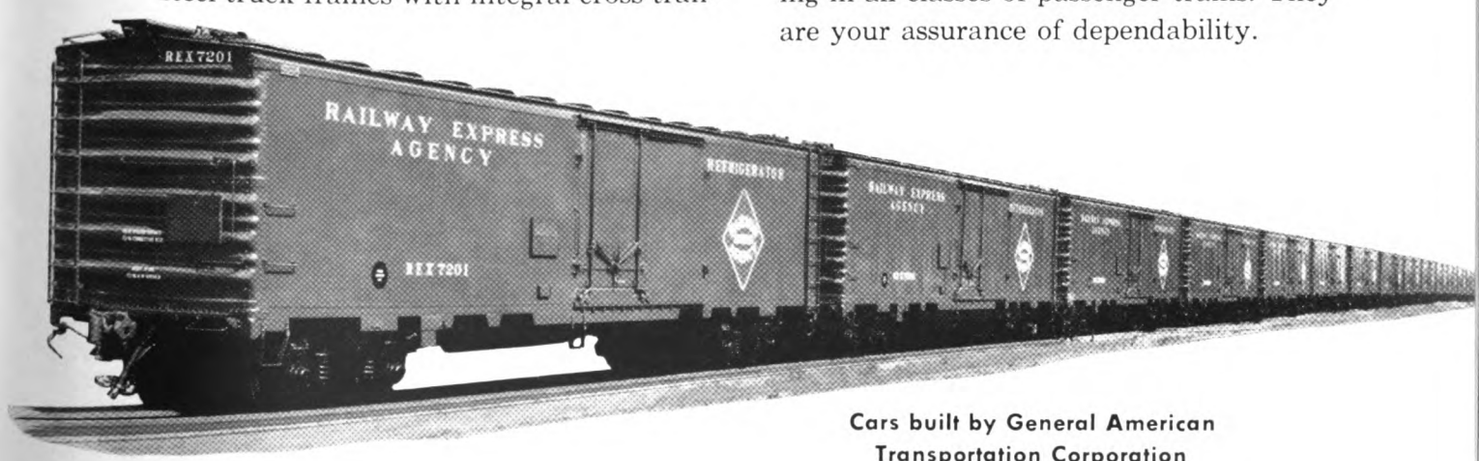


The Railway Express Agency orders Second Lot of 500 Express-Refrigerator Cars with Commonwealth BX Type Trucks

Because of the performance of a previous lot of 500 cars equipped with Commonwealth BX Trucks the Railway Express Agency recently placed a repeat order. Here is *true proof* of satisfactory service.

Equalization, swing motion, coil springs and friction snubbers combine to provide smoother, safer riding of loaded or light cars, protecting car contents and minimizing damage claims. Rigid one-piece cast steel truck frames with integral cross transoms and pedestals insure axles and bearings being in tram at all times. As the truck frame is spring supported, unsprung weight is less than with other types of trucks, reducing impact on rails, crossings and bridges. Wear of brake shoes and brake rigging is at a minimum.

Commonwealth BX Type Trucks are approved for all types of express-refrigerator, box-express and merchandise cars operating in all classes of passenger trains. They are your assurance of dependability.



Cars built by General American Transportation Corporation

GENERAL STEEL CASTINGS

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F.O.-102
the chlorinated
CARBON REMOVER
for Hot Tank Dip

To speed the cleaning operation of DIESEL PARTS put F.O.-102 to work in your maintenance departments. This highly effective cleaner has been thoroughly tested to assure top performance. . . . When used in the prescribed manner it will save hours of hand labor and add to the life of pistons, piston rings, fuel pumps, carburetors and engine assemblies.

F.O.-102
INCORPORATES ALL THE ESSENTIALS SOUGHT IN A CARBON REMOVER

- *High Flash Point*
- *Low Toxicity*
- *Non-corrosive to metal surfaces*
- *May also be used as a cold dip*
- *Meets the requirements of AF-20043A*

For Cold Dip—Use fast acting
F.O.-185
(non-inflammable — low toxicity)

TRY FINE ORGANICS' other well known accepted products:

F.O.-128 and F.O.-101—Safe-tee Solvents
F.O.-106 and F.O.-116—Emulsion Cleaners

Our representative will be glad to call upon request. Write to Dept.3

FINE ORGANICS, Inc.
211 East 19th St. · New York 3, N. Y.

EQUIPMENT

(*Continued from page 82*)

ments of Class H silicone materials and having extremely good solvent resistance is now available. It is made of flexible straight-weave continuous-filament glass fabric, coated with a modified-silicone resin and bears the designation T-9278.

Dielectric strength of the material as measured by the short-time, ¼-in. diameter electrode method is 1,250 volts per mil at 1,000 hours, 200 deg C. Solvent resistance after 48 hours in both toluene and alcohol is good and after 48 hours immersion in 100 deg C oil, no evidence of desintegration is observed. The new insulation is said to have a 10-yr life at 177 deg C, based on extrapolated data.

The material weighs approximately ½ lb per sq yard, is 0.007 in. thick, and has a tensile strength of 164 lb. per in. width. *Westinghouse Electric Corporation, Micarta Div., Dept. RLC, Trafford, Pa.*

Diesel Safety Switch

A new type of temperature-and-pressure-sensitive switch for diesel engines has been designed to stop or idle the engine, or set off an alarm. The switch is said to respond to abnormal temperatres (up to 250° F) or pressures (to 70 psi) where overheated engines could result in internal damage.

There are two separate systems in the switch, one for temperature measurement, one for pressure measurement. Both are mounted on a common frame and enclosed in a compact metal case.

The temperature system is a remote bulb, capillary and diaphragm assembly that measures engine coolant temperature. The pressure system measures engine lubricating oil. As the temperature rises or the pressure drops to danger levels, small, precision micro-switches on each system trip off the final engine control element or the alarm circuit.

A special "fail-safe" feature is built into the temperature system that will idle or stop the engine if damage occurs to any of the components of the measuring system.

Also incorporated in the new switch is an arrangement permitting the temperature and pressure set points to be adjusted in the field.

The pressure mechanism can be started and stopped manually by an external knob. The pressure system will automatically move from "start" position to "run" position when the oil reaches its operating pressure.

Although designed primarily for diesel engines, the manufacturers say the switch system can be applied to measure any liquid or non-combustible gas that will not damage the copper temperature bulb or stainless steel pressure diaphragm.

Minneapolis-Honeywell Regulator Co., Industrial Division, Dept. RLC, Wayne & Windrim aves., Philadelphia.

Over the Floor Wiring

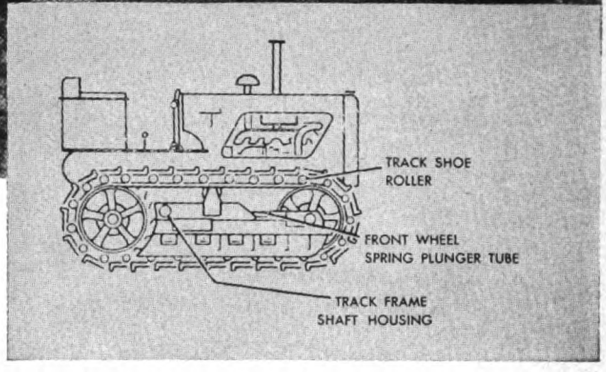
Called Electriduct, the over-the-floor electrical extension cord shown allows electrical outlets to be placed out in the middle of the room without running conduit under the floor. Made of rubber, it is unobstructive and eliminates messy tangled cords. Equipment on casters may be rolled over it easily. One end is plugged into a wall outlet and the other end has a two-way receptacle. The duct is 2¾ in. wide at the base which rises from a feather edge to an apex of 7/16 in. Ribs on the under side prevent slipping on the floor and the enclosed wiring is safe from moisture. The complete duct system ready to plug into a well outlet, is available in standard 4, 5, 6 and 10-ft lengths. *Ideas, Inc., Dept. RLC, Laramie, Wyo.*

A-C Power Supply

A self-contained 3-kw, a-c power supply for mobile lighting and heating requirements is now available. Consisting of an alternator, a regulator and rectifier, the power supply package may be used with lighting systems on applications such as construction vehicles, power shovels, railway maintenance-of-way equipment, etc.

Operating independently of any other source of electrical power, the power

(*Continued on page 91*)



For top performance and long service

this rugged Tractor relies on machine parts of

SHELBY SEAMLESS TUBING

In this powerful Oliver OC-12 Bulldozer, the following parts are fabricated from Shelby Seamless Mechanical Tubing — track shoe rollers, front wheel spring plunger tubes, and the track frame shaft housing. The chief qualifications possessed by these parts are high strength and superior wearability . . . qualities that are just right for a heavy-duty tractor application.

Super-rugged equipment calls for super-strong materials. That's why you'll find USS Shelby Seamless Mechanical Tubing being used for so many tractor applications. Its great strength, complete uniformity, and extreme dimensional accuracy make Shelby Seamless the ideal mechanical tubing for the fabrication of machine parts subject to bruising performance and long wear.

Available in a wide range of diameters, wall thicknesses, various shapes and steel analyses, Shelby Seamless Mechanical Tubing is produced to exacting standards by the world's largest manufacturer of tubular steel products. Contact our engineers for recommendations. They will welcome the opportunity to help you apply Shelby Seamless to your specifications.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **SHELBY SEAMLESS MECHANICAL TUBING** WALLS WITHOUT WELDS

UNITED STATES STEEL

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FOR THE FIRST TIME:

A *GUARANTEED* SPRING FOR FREIGHT-CAR TRU

Now . . . the freight-car truck springs you buy from ALCO are guaranteed against breakage for 10 years

Only ALCO makes this guarantee: If any ALCO freight-car truck spring purchased from now on, breaks within ten years of the date of manufacture, a new spring will be furnished by ALCO free of charge. This guarantee is prompted by the record of ALCO springs in service, and by the modern, automated ALCO facilities that assure uniform spring quality. Only with ALCO *guaranteed* springs can you be so confident of spring performance and service.

The next time you buy freight-car truck springs, specify ALCO *guaranteed* springs. The guarantee is your assurance of top quality and service in springs made by one of the nation's largest railroad suppliers. For more information about ALCO *guaranteed* springs, contact your ALCO representative.

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NEW YORK

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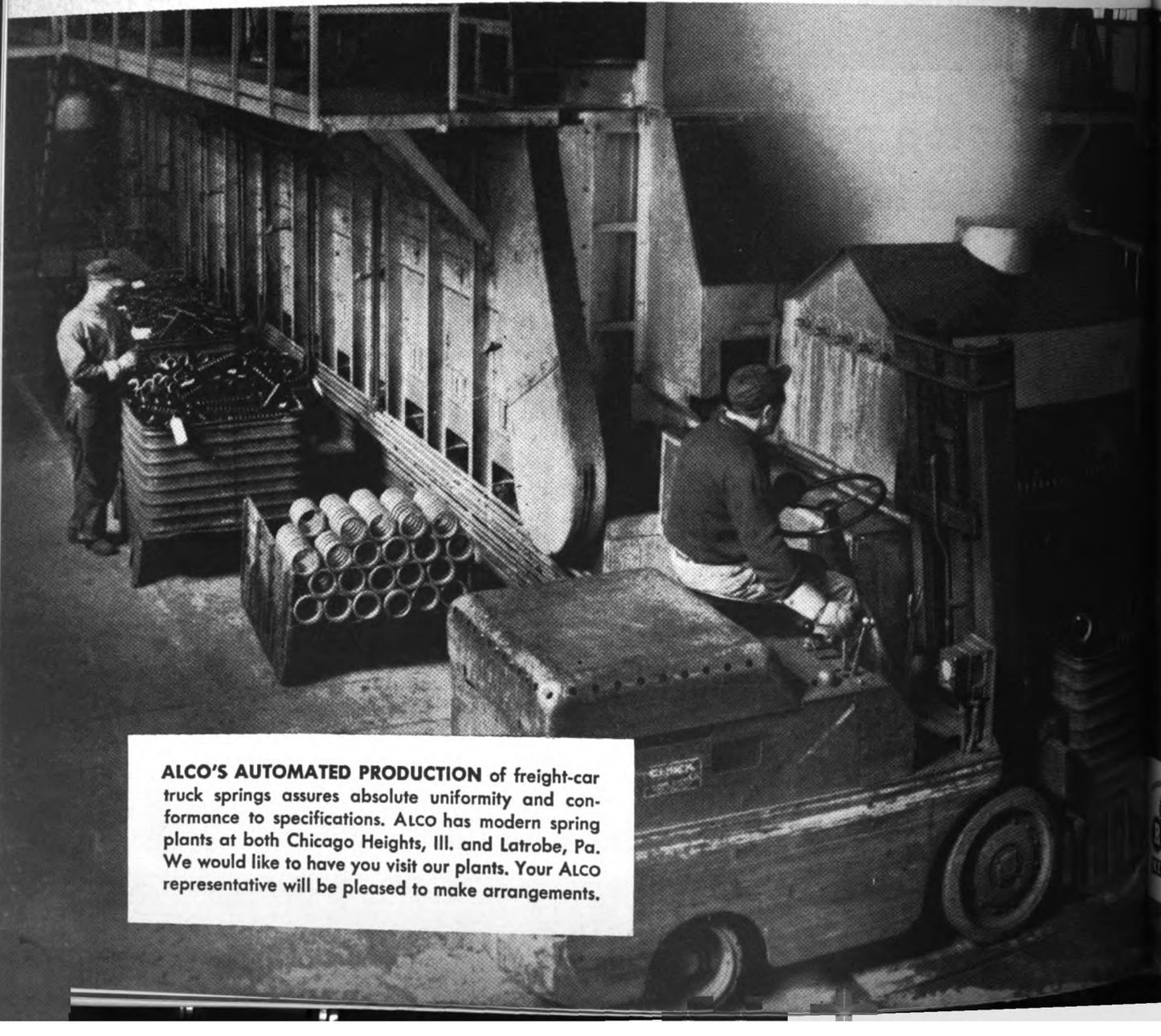

ALCO'S AUTOMATED PRODUCTION of freight-car truck springs assures absolute uniformity and conformance to specifications. ALCO has modern spring plants at both Chicago Heights, Ill. and Latrobe, Pa. We would like to have you visit our plants. Your ALCO representative will be pleased to make arrangements.

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Equipment

TRUCKS

This ALCO guarantee applies to these springs*: (Standard AAR Designs)

1. 2-1/2-in. travel
2. 3-1/16-in. travel
3. 3-11/16-in. travel
4. 1915-D
5. 1936-D-2

*Except springs for brine refrigerator cars.

FREIGHT-CAR TRUCK SPRING has ALCO date of manufacture stamped on coil. If it breaks within a period of ten years from that date, a new spring will be furnished free of charge by ALCO.

Keeps motors running like new... **The easy, fast way to restore commutators and slip rings — WITHOUT DISMANTLING! — Substitutes low-cost prevention and correction for high-cost repair and rebuilding — COSTS LITTLE, SAVES A LOT.**

RESURFACERS
Refinish commutators and rings to like-new condition even when ridged, scored or burned.

MICA UNDERCUTTERS
Stop sparking — help commutation — prolong brush life. For all sizes of commutators.

PRECISION GRINDERS
For more than surface smoothing—under machine's own power. Accurate to .001".

FLEXIBLE ABRASIVE
Cleans and burnishes commutators. Non-dusting. Complete size range.

FREE 39-page Handbook — Complete information on commutator maintenance. MAIL COUPON.

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HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

AIR DIFFUSERS. 80-page Selection Manual No. 60 on air diffusers for air-conditioning, heating and ventilating systems contains numerous diagrams, and tables to aid in the selection of diffusers and accessories for all-air high velocity as well as conventional air-conditioning systems and units. Illustrates over 90 types of round, square and straight-line diffusers. Includes also air-distribution definitions, sound level characteristics, static pressure factors, and typical installations. (Write: *Anemostat Corporation of America,* Dept. RLC, 10 East 39th st., New York.)

PORTABLE DRILL.—8-page bulletin describes the "Toggle Bug," a portable drill for drilling, reaming, or countersinking holes 2½ in and larger in any spot in any size shape or plate. Drills several pieces simultaneously. (Write: *Guibert Steel Company,* Dept. RLC, P.O. Box 4342, Pittsburgh 4.)

INDUSTRIAL HOSE AND FITTINGS. 12-page Bulletin No. 182, an abbreviated version of complete line Aeroquip Industrial Catalog, lists hose, fittings, Socketless kits, and self-sealing couplings for use in the replacement field. Includes instructions for ordering, installation planning and assembly. (Write: *Aero quip Corporation,* Dept. RLC, Jackson, Mich.)

LOCOMOTIVE PARTS SERVICE—12-page Bulletin GEA-6534 outlines nine reasons why the G-E parts service can reduce railroad maintenance cost and increase operating efficiency. Map shows five regional railroad parts centers. (Write: *General Electric Company,* Dept. RLC, Schenectady 5, N. Y.)

DRUM AND CAM SWITCHES. 8-page bulletin GEA-6307A describes features of complete line of drum and cam switches for manual and automatic control of wound-rotor, squirrel cage, d-c series, and compound-wound motors. Continuous operation requirements listed and dimensions and selection data are provided. (Write: *General Electric Company,* Dept. RLC, Schenectady 5, N.Y.)

STORAGE BATTERIES.—10-page bulletin No. GB-1078B describes the Gould Kathanode diesel locomotive starting battery. Complete engineering specifications with ampere-hour capacities, unit dimensions and approximate battery weights listed. Connecting diagrams and application for various models of diesel locomotives also given. (Write: *Gould-National Batteries, Inc.,* Dept. RLC, Trenton 7, N. J.)

SPRAY FINISH MACHINE.— 12-page catalog covers four basic types of automatic transverese spray finishing machines—horizontal straight line, horizontal contour, vertical straight line and vertical contour machines. Models and specifications of horizontal and vertical straight line types included, as well as typical uses. Contour machines in both types also described. (Write: *DeVilbiss Company,* Dept. RLC, Toledo 1.)

BEARING METAL. 4-page bulletin describes babbitt metals made by Glyco process and their advantages. Five different types in as many hardness ranges listed, together with applications for which each is suitable. Information included on how to pour Glyco metal and get perfect bearings. (Write: *Joseph T. Ryerson & Son,* Dept. RLC, 8000-A, Chicago 80.)

KATHANODE BATTERIES. 6-page bulletin No. GB-1079B describes Gould Kathanode batteries for car-lighting and air-conditioning applications. Gives full details of battery construction, including Tite-Seal posts, heavy duty diamond "Z" grids, regenerative oxide, etc., also complete engineering specifications with ampere hour capacities, unit dimensions and approximate battery weights. (Write: *Gould-National Batteries, Inc.,* Dept. RLC, Trenton 7, N. J.)

V-BELTS.—12-page bulletin, 20X6234C, contains tips on how to obtain "Longer Belt Life for Your V-Belt Drives." Describes various types of V-belts; tells how to select and match them, and lists seven steps for their correct installation. (Write: *Allis-Chalmers Manufacturing Company,* Dept. RLC, Milwaukee 1.)

POWER SAW.—4-page brochure describes the new C-12 power saw and its economies. Chart shows cutting rates and tool costs for machining most carbon and alloy steels. (Write: *DoALL Company,* Dept. RLC, Des Plaines, Ill.)

NAILABLE STEEL FLOORING. 12-page booklet describes uses and advantages of N-S-F steel flooring for freight cars and details line of accessories, which includes N-S-F for upper-decking in box cars, doorposts for lading protection and blocking security, and grain strip. Engineering drawings show typical application details put into use on over 50,000 box cars and gondolas by 62 railroads. (Write: *Stran-Steel Corporation,* Dept. RLC, Detroit, 29.)

"CUMMINS PT FUEL INJECTION SYSTEM." 12-page booklet, printed in four colors, answers such questions as how many parts are in the system; is the fuel metered in the pump or in each individual injector; does the system have to be timed to the engine. PT fuel pump assemblies as well as the PT injector illustrated in cutaways. Section also devoted to optional governor arrangements. (Write: *Cummins Engine Company,* Dept. RLC, Columbus, Ind.)

EQUIPMENT

(Continued from page 86)

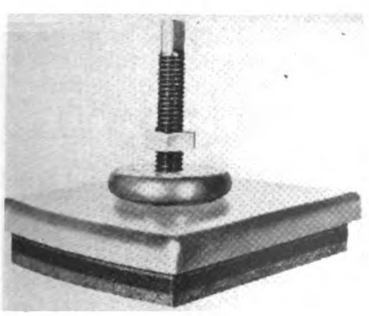
supply package may be applied wherever an accessible rotating shaft exists for a lighting, heating, or other non-frequency responsive load.

Specifically intended to be belt-coupled to a rotating shaft, the alternator has an automotive-type three-point mounting for easier installation and adjustment of belt tension. The unit can withstand rotational speeds up to 10,500 rpm. It does not require interconnection with existing electrical systems.

Pre-set at the factory, the regulator is a finger-type unit and capable of holding output voltage variation to plus or minus 3 per cent from no load to full load, and from minimum to maximum alternator speeds.

Encapsulated for moisture resistance, the Vac-u-Sel field excitation rectifier comes with brackets for ease in mounting. Rectifiers are also available for powering small power tools utilizing series universal motors.

Voltage output of the system is constant with varying frequency, single-phase a-c power. Sufficient power to light 30, 100-watt lamps is provided by the 3-kva alternator. *Specialty Motor Department, General Electric Company, Dept RLC, Schenectady, N. Y.*

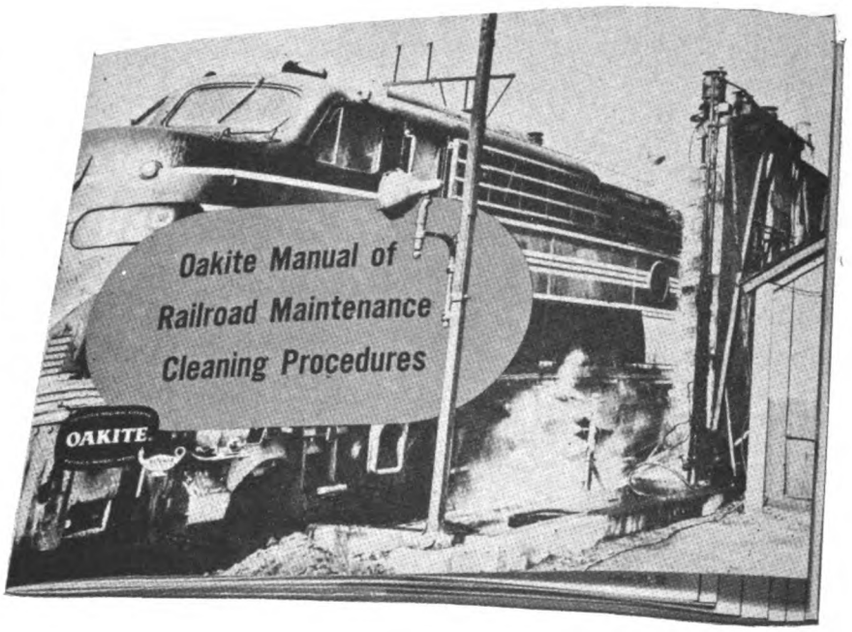


Machinery Mount

Level-Rite, a self-leveling machinery mount, have been developed for mount-

A Working Guide to

LOW-COST END RESULTS



For *real* railroad cleaning economy you must have *man-hour* economy, too. So look to the speed and thoroughness with which a man cleans when using the best materials . . . and at the *methods* which can save endless hours of work.

This new booklet gives you a good look at eight important groups of jobs where you can profit from Oakite railroad cleaning experience, research done especially for railorads, and high quality materials engineered for specific problems. You'll see valuable information on cleaning exteriors, interiors, running gear and trucks, parts, cooling system maintenance and many more jobs.

Send for this booklet without obligation. Find out why most railroad men rely on Oakite cleaning as the standard for maintenance operations. Write OAKITE PRODUCTS, INC., 46 Rector Street, N. Y. 6, N. Y.

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OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

. . . gives you the important advantage
LOW-COST END RESULTS

Export Division Cable Address: Oakite

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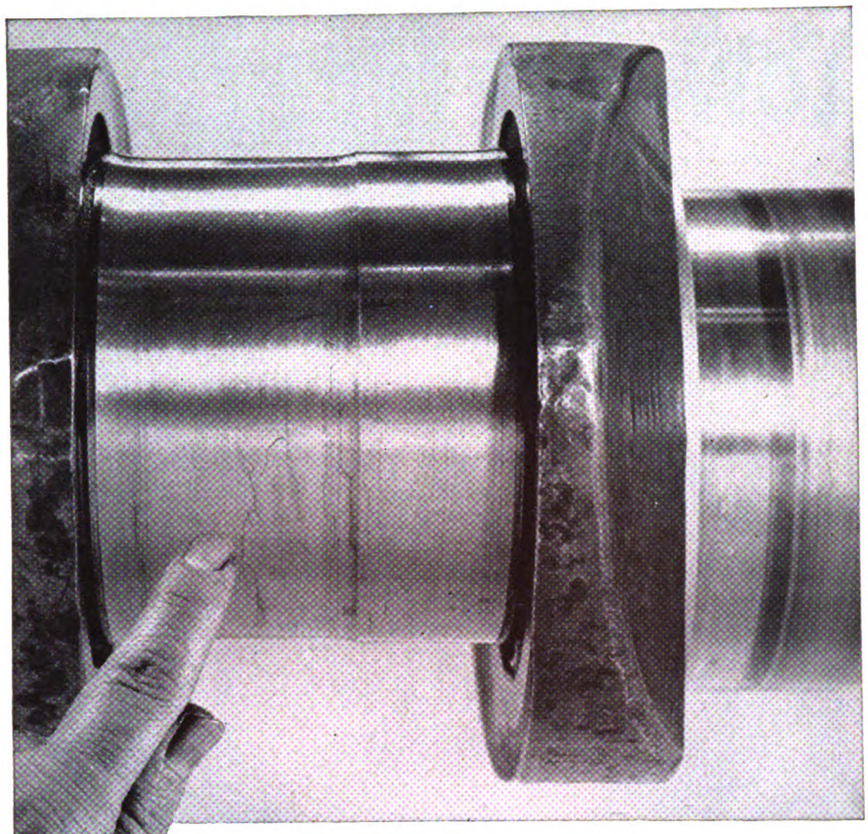
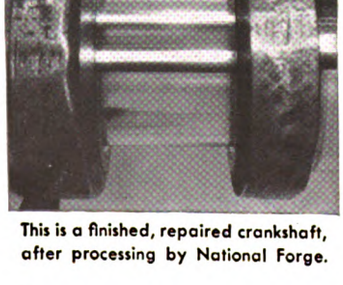


THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-1



This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE AND ORDNANCE COMPANY

Irvine (Warren County), Pa.

ing machinery where extreme mobility and leveling ease is required. It consists of an all-steel base unit with leveling screw and plate, combined with a special Unisorb vibration-dampener pad.

There are seven models, with loading ranges from 800 to 7,500 lb per unit, in four sizes: 4 in. by 4 in., 6 in. by 6 in., 8 in. by 8 in. and 10 in. by 10 in. One unit is required for each machine leg or mounting point.

This mount, it is said, features an exclusive screw-post design to quickly and easily level a machine and new compression anchoring. Once set, machines stay level without further adjustment. No bolts, lag screws or cement are needed for anchoring, since the compression design provides positive hold, with no "walking" or creeping under side loads. Machines can be moved whenever and wherever required. According to the manufacturer, the special damper pad will reduce transmitted vibration up to 85%. It is resilient, will not deteriorate, and is impervious to cutting fluids and cleaning compounds. *Felters Co., Unisorb Division, Dept. RLC, 210 South st., Boston 11.*

Transporter Carries Own Charger

Operator-led electric driven industrial trucks are now available equipped with battery and charger combination units. Since the charger can be plugged into any 115-volt, 60-cycle a-c lighting circuit without disconnecting the battery truck lead connector, recharging of the battery can be done any time the truck is not in use.

Up to 23 per cent savings in initial capital investment in batteries and chargers are reported. Elimination of the necessity for a central charging point effects savings in operator travel time and in valuable space.

The transporter with battery-charger combination is well adapted to single-shift operation. If the battery is fully discharged, it can be recharged in 10 to 16 hours. No attendant is needed as the charger will automatically cut charging rate, so that indefinite charging may con-

tinue without harm to the battery. The low finishing rate reduces gassing and flushing requirements. *Automatic Transportation Company, Dept RLC, 149 W. 87th st., Chicago 20.*

Self-Powered Amplifier

A self-powered, portable public address system, known as the Lustraphone, with fully transistorized 10-watt amplifier has been made available. The unit makes possible the advantage of public address amplification wherever cost or lack of technical assistance are limiting factors. Railroads, sightseeing buses, local social, athletic and business affairs are examples of application.

The transistorized amplifier, 8-in. loudspeaker, batteries and press-to-talk microphone are housed in one complete portable case. There is nothing to hook up. The user simply flicks a switch, speaks into the microphone. Full tone and volume controls are provided together with terminals for additional speakers. *John Ould U.S.A. Ltd., 519 South 5th ave., Mount Vernon, N. Y.*

SUPPLY TRADE NOTES

(*Continued from page 14*)

CONTINENTAL-DIAMOND FIBRE CORPORATION.—The name of the *Continental-Diamond Fibre Division* of the *Budd Company* has been changed to the Continental-Diamond Fibre Corporation, a Budd subsidiary.

■

JOHN A. ROEBLING'S SONS CORPORATION.—*Douglas W. Vernon* has been appointed product sales manager for wire rope and aircord, with headquarters at Trenton, N. J.

■

GARLOCK PACKING COMPANY.—*William E. Crowley*, Pittsburgh sales representative, has been appointed district manager at San Francisco.

■

JOHNS-MANVILLE SALES CORPORATION.—*Reginald L. Johnson* has been elected vice-president. Mr. Johnson becomes also sales promotion manager, succeeding *H. M. Shackelford*, retired.

■

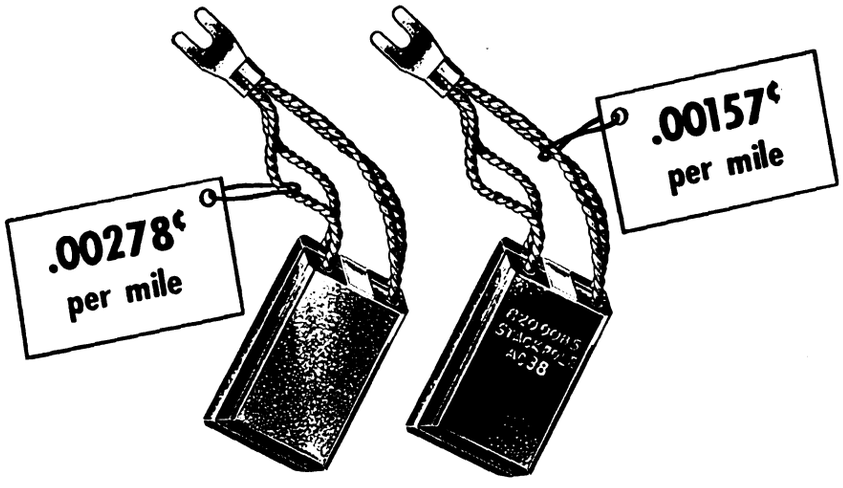
EVANS PRODUCTS COMPANY.—*Evco, Inc.*, a wholly owned subsidiary of Evans Products, has changed its name to *Haskelite Manufacturing Corporation*, the assets of the Haskelite Company having been acquired by Evans Products.

■

ESSO STANDARD OIL COMPANY.—*Earl W. Ball*, assistant manager, railroad sales division of Esso Standard Oil Company, has been appointed manager of the division. Mr. Ball succeeds *Frederick C. Davern*, retired.

■

OCTAGON PROCESS, INC. — *Joe Weiser* has been appointed manager, Railroad Sales Division, with headquarters at 15 Bank street, Staten Island, N. Y.



What if brush prices included commutator reconditioning costs?

Long diesel-electric brush life is highly important. By no means, however, is it the only factor by which brush efficiency should be judged.

Let's assume that brush type A has an average life of, say, 50,000 miles. Brush type B lasts 100,000 miles. Therefore brush A requires six changes in the usual diesel reconditioning span of 300,000 miles. Meanwhile, brush B is only changed three times.

But Type A is kind to commutators! Things run smoothly the full 300,000 miles. Type B, while lasting longer, bar burns the commutator to the extent that an extra reconditioning is required before the 300,000 mile mark is reached.

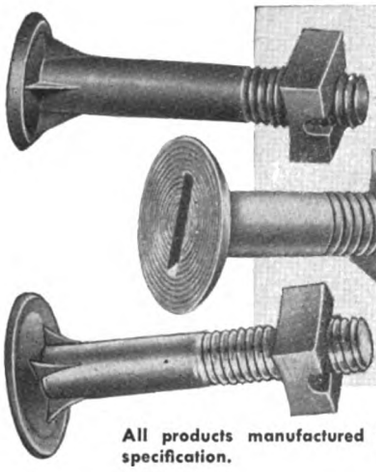
Brushes cost about $12 per set versus approximately $400.00 for commutator reconditioning. Thus the result is easy to figure: *The true cost of type A brushes has been about .00157¢ per mile as compared to the 77% higher cost of .00278¢ per mile for brush type B.*

While only a rough example, such figures show why Stackpole engineering is based on the firm belief that smooth commutation is every whit as important as long brush life—and that the best brush for most uses is the one that strikes a happy medium between these two sometimes incompatible factors.

STACKPOLE
diesel
BRUSHES

...They help keep diesels rolling...*profitably*

STACKPOLE CARBON COMPANY, *St. Marys, Pa.*



FLUSH FIT MOISTURE TIGHT..

...WITHOUT COUNTERSINKING

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

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504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

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Objective: LOWER OPERATING RATIOS using HEAVY FUEL OILS treated by

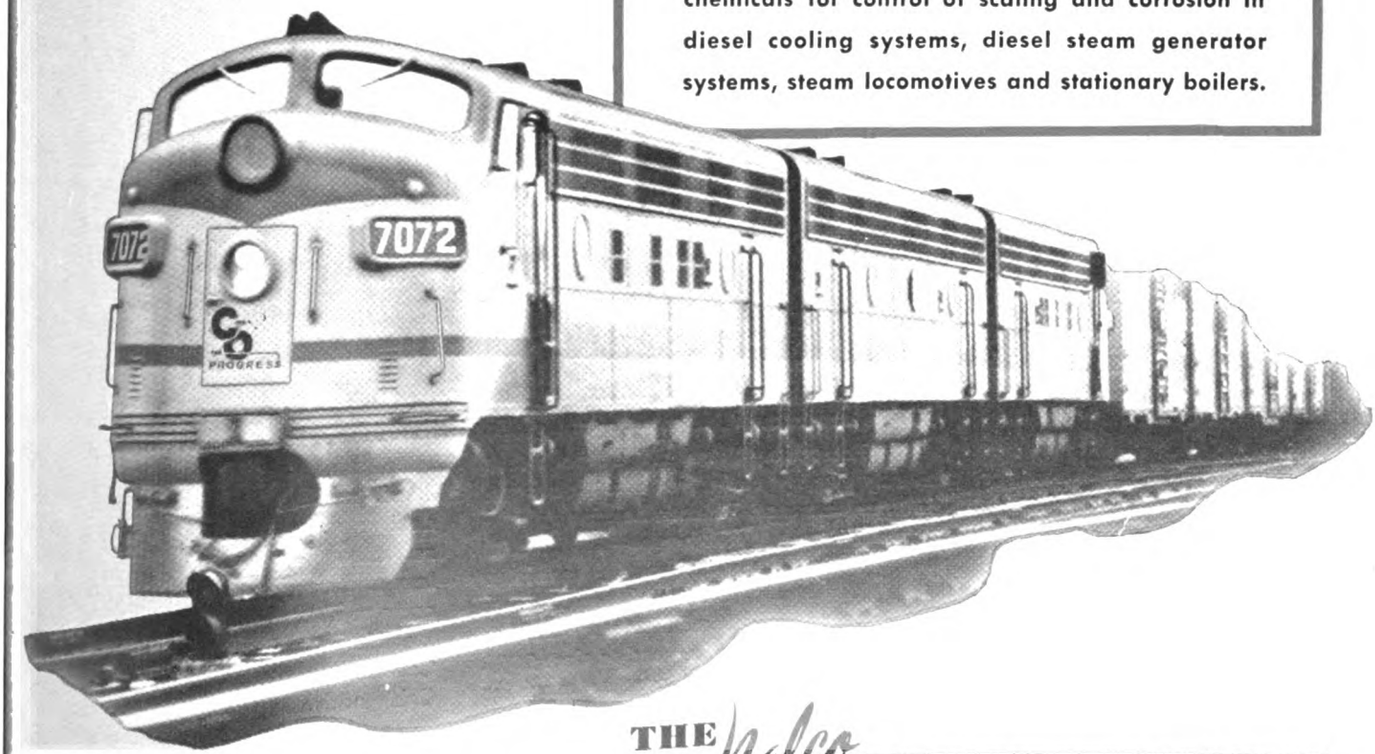
nalco®

● Nalco is proud to have the privilege of working with the "Progressive Chesapeake and Ohio Railway" toward the objective of lower operating ratios using heavy fuel oils properly treated with Nalco Fuel Oil Treatments.

In addition to initial cost savings using heavy fuel oils and Nalco Treatment, there are also these added operating advantages: greater fuel efficiency, minimized sludging problems on the locomotive, in storage and fueling facilities.

For full details on Nalco Fuel Oil Treatments to help you attain the objective of lower operating ratios, call your Nalco Representative, or write direct.

Other Nalco Products in use by the C. & O. include chemicals for control of scaling and corrosion in diesel cooling systems, diesel steam generator systems, steam locomotives and stationary boilers.



THE *Nalco* SYSTEM • Serving Railroads through Practical Applied Science

NATIONAL ALUMINATE CORPORATION
6190 West 66th Place • Chicago 38, Illinois
In Canada: Alchem Limited, Burlington, Ontario

The taper makes TIMKEN® the only journal bearing that delivers what you expect when you buy a roller bearing

THERE are only two reasons for putting freight car journals on roller bearings: 1) To end the hot box problem, and 2) To cut operating and maintenance costs to a bare minimum. The Timken® tapered roller bearing is the only journal bearing you can depend on to do both these jobs. It's the taper. And here's why:

(1) *Positive roller alignment.* The taper in Timken bearings holds roller ends snug against the rib, where wide area contact keeps rollers properly aligned. Full line contact is maintained because rollers can't skew.

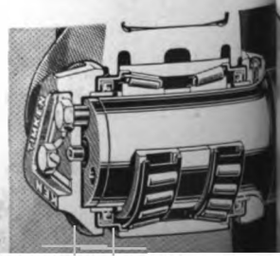
(2) *No lateral movement within the bearing.* Because of the taper, there's no lateral movement to pump lubricant through the seal. Lubricant does not leak out of the journal box and onto the rails causing costly diesel locomotive wheel slip. Costly lubricant is saved, lubricant replacement cost cut. And because there's no lateral movement, there's no scuffing of rollers and races to shorten bearing life.

Unlike costly "crutch" devices that merely attempt to improve friction bearing performance, Timken bearings eliminate the *cause* of hot boxes—the friction bearing itself. And Timken bearings bring operating and maintenance costs down to rock bottom. Timken bearings cut terminal bearing inspection time 90%. They reduce lubricant cost as much as 95%. Fact is, the new Timken heavy-duty type "AP" (All Purpose) journal bearing assembly can go three years without the addition of lubricant. These are the reasons why over 21,000 freight cars now roll on Timken bearings, why more and more railroads are going "Roller Freight".

Be sure you get Timken tapered roller bearings. They're the only bearings that deliver what you expect when you buy roller bearings to end the hot box problem and cut operating and maintenance costs to a minimum. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD

TRADE-MARK REG. U. S. PAT. OFF.



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RAILWAY LOCOMOTIVES AND CARS

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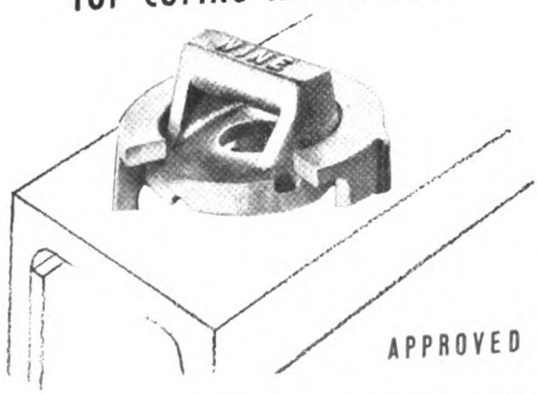

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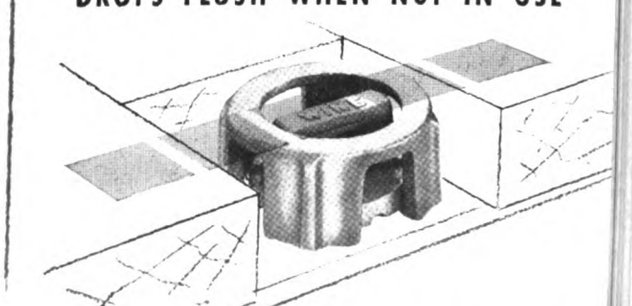

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Diesel locomotives can now mix their fuels *without incompatibility*... thanks to FOA-2

As they travel across the country, diesel locomotives are, of course, refueled from a number of different stocks. The well-known incompatibility of many different fuels is a serious problem. And the increasing use of economy fuels makes it all the more serious. A *blend* of diesel fuels—even those which are individually quite stable—is often unstable.

To stabilize fuels, to minimize sludge, many leading railroads are using fuel oils containing Du Pont Fuel Oil Additive No. 2. Result: blends of cracked and straight-run stocks are made stable and kept stable. This remarkable additive itself is compatible with all types of diesel fuels.

Filter and injector troubles prevented

FOA-2 is an excellent dispersant and solubilizer as well as stabilizer. When added to fuels containing insoluble residues, it minimizes the size of the particles comprising them. Hence the residues flow through the system and burn with the oil.

Because of this, FOA-2 improves the filterability of any diesel fuel stock, and prevents injector-sticking and filter-plugging.

Ashless

FOA-2 will not contribute to exhaust-stack sparking because it is both non-metallic and ashless. It does not form deposits—it *burns*.

It's economical, too, because only minute concentrations are required to provide stability. Addition of FOA-2 is simple and inexpensive. A Du Pont representative will be glad to explain to you in detail the use and advantages of Du Pont FOA-2.

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. . . through Chemistry

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900 MORE refrigerator cars
—all with HYATT HY-ROLL BEARINGS!

"This is why we've ordered 900 MORE refrigerator cars equipped with Roller Bearings"

says Jno. C. Rill, President, Fruit Growers Express

"Flavor is a fleeting thing," says Mr. Rill, "so our constant aim is to provide faster, more dependable transportation for perishables and concentrates. That's why, three years ago, we made our first major investment in roller bearing refrigerator cars. The results have proved so satisfactory that we have now ordered 900 more cars equipped with roller bearings." All 900 roller bearing refrigerator cars ordered by Fruit Growers Express are *100% Hyatt equipped*—another example of the high priority given Hyatt Hy-Roll Bearings in today's railroad modernization programs. Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

Another GM GENERAL MOTORS contribution to railroad prosperity

HYATT Hy-ROLL BEARINGS
FOR NON-STOP FREIGHT

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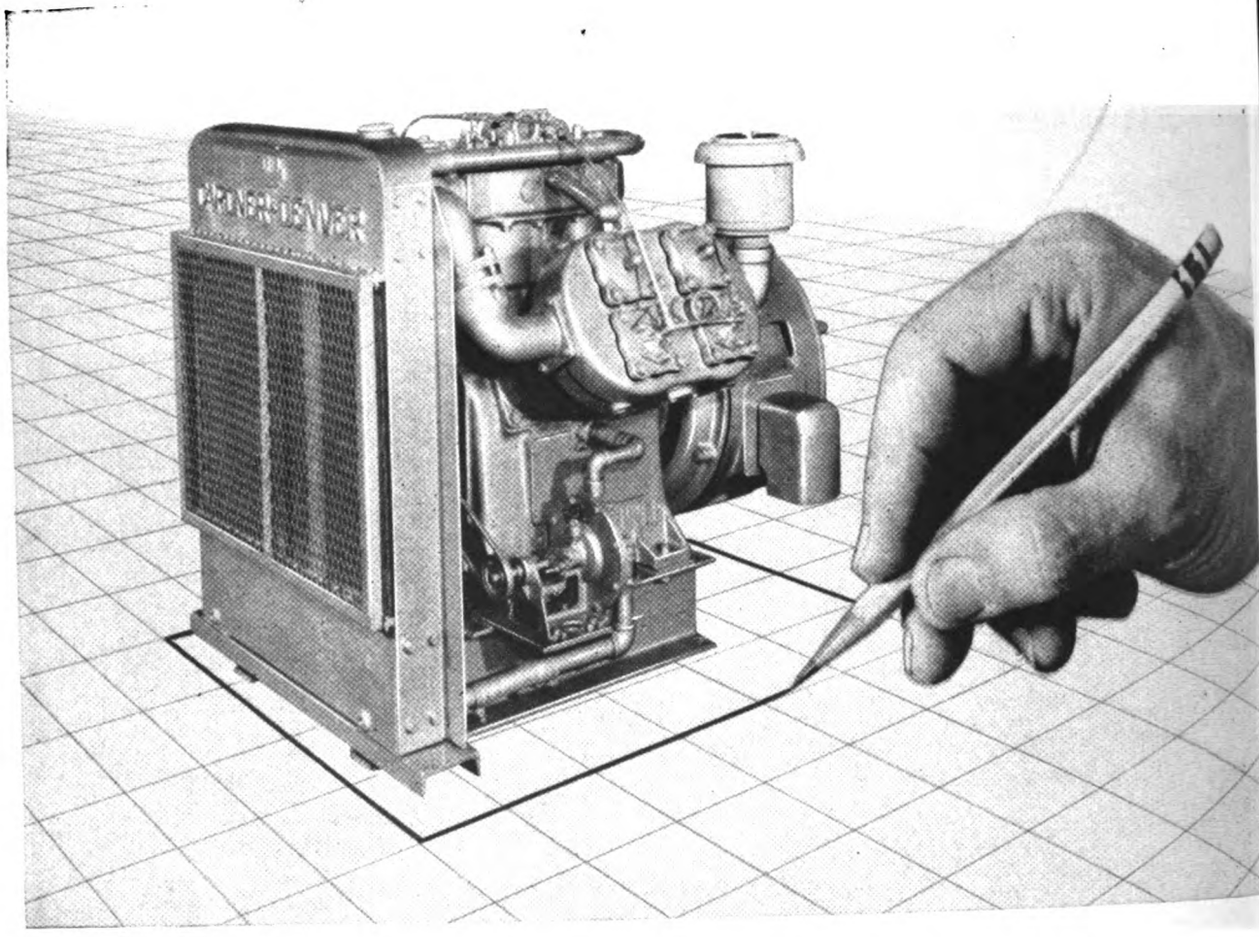

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These compressors can help solve it

With space around car and engine shops always at a premium, you can't afford to "bottle it up." Here is a compact source of air power you don't have to scratch your head to find a place for—a Gardner-Denver WB. You can get 686 c.f.m. in a 67″ x 67″ space. Take a look at the specifications:

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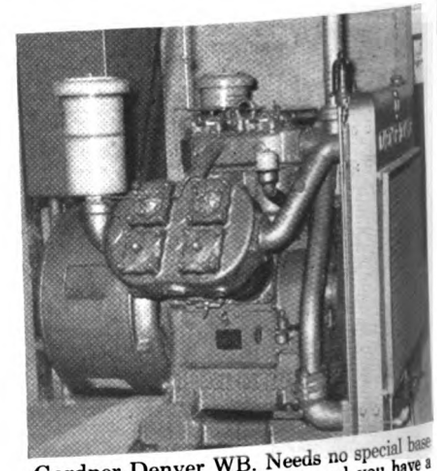
49″	52″	50	WBQ
56″	56″	75	WBH
67″	67″	100	WBK
67″	67″	125	WBJ
72″	68″	200	WBN



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Founded in 1832 as the American Rail-Road Journal

JUNE, 1957 VOLUME 131, No. 6

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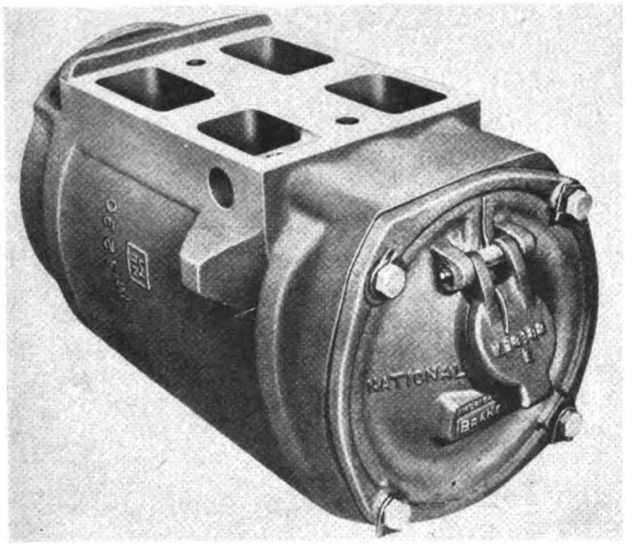
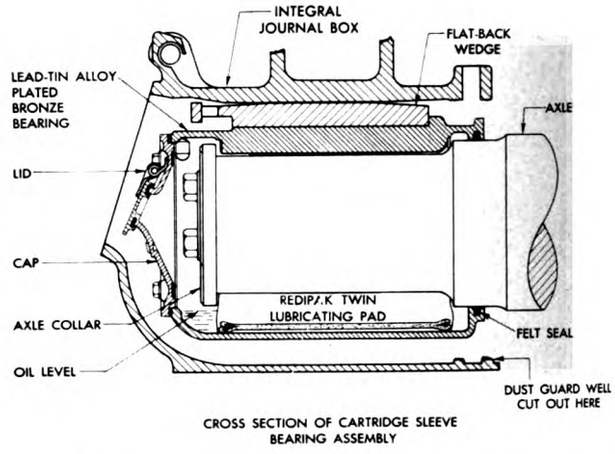
NEXT MONTH:

Pennsy's Big Box Cars

Insulating Varnishes are Vital





CROSS SECTION OF CARTRIDGE SLEEVE BEARING ASSEMBLY

Bearing housing (left) is leaded-bronze casting which fits into the standard journal box. Bearing is part of the inner surface of this casting, while oil reservoir is formed by its shape at the bottom (above).

National Cartridge Bearing

Additional interchange service applications of the National Cartridge Bearing have recently been authorized by the AAR. After exhaustive laboratory testing by Brake Shoe, by the AAR's Chicago laboratory and after independent road tests by individual railroads, the AAR has now authorized the further trial of 800 car sets, making a total of 1,000 sets for interchange service.

The National Cartridge Bearing has been designed by American Brake Shoe to combine features of both solid and roller bearings. A completely sealed bearing and lubrication system in itself, the cartridge bearing is a precision sleeve bearing in its own integral housing, which contains oil reservoir and lubricating pad. It fits into the standard freight car integrally cast journal box, or can be used in pedestal type side frames.

In actual road tests since August 1955, the new cartridge bearings have successfully withstood today's freight service demands. A wheel car on the Great Northern running between Superior, Wis., and Minot, N.D., operated successfully under the severest of winter conditions. The car accumulated 15,000 miles of service, both loaded and empty, at temperatures below zero most of the time and as low as 40 below repeatedly.

A Santa Fe car handling locomotive traction motors and generators between Cleburne, Tex., and San Bernadino, Cal., accumulated 40,000 car miles in the sand and heat of the southwest. The indicated oil consumption was 0.33 oz per 1,000 miles.

An Erie passenger coach was utilized to accumulate high mileage. Two cartridge units on this car have been in continuous service for 75,000 miles and 6 units for 40,000 miles. The coach has been in both main line and commuter service constantly. Despite the end thrust encountered on routes with high curvature, bearing performance has been excellent.

Inspection of disassembled cartridge units after all of these tests disclosed no measurable wear. Chemical analysis of oil samples taken after test showed that the seal effectively prevents moisture, dust, dirt, or other foreign substances from getting into the bearing. Maximum oil consumption, even under the worst test conditions, was no more than 0.4 oz per 1,000 miles. Road tests confirmed findings of Brake Shoe's bearing research laboratory where every extreme of climate, speed, and misalignment can be duplicated. Development of the new cartridge bearing had started in 1953.

The new cartridge bearing is cast of a high-strength leaded bronze, and plated with a lead-tin alloy lining of the type used in diesel engine crankshaft and connecting rod bearings. The oil reservoir, in which the lubricating pad is placed and the rear seal housing are cast integrally with the bearing.

A single felt ring, lubricated for low friction and long life, makes the seal. It rides on the conventional axle dust guard seat. The front cover is bolted on and has an oil level inspection opening with self-closing lid. The wedge is an approved type adapter. With the flat back adapter there is no movement of the bearing from accelerating or decelerating forces.

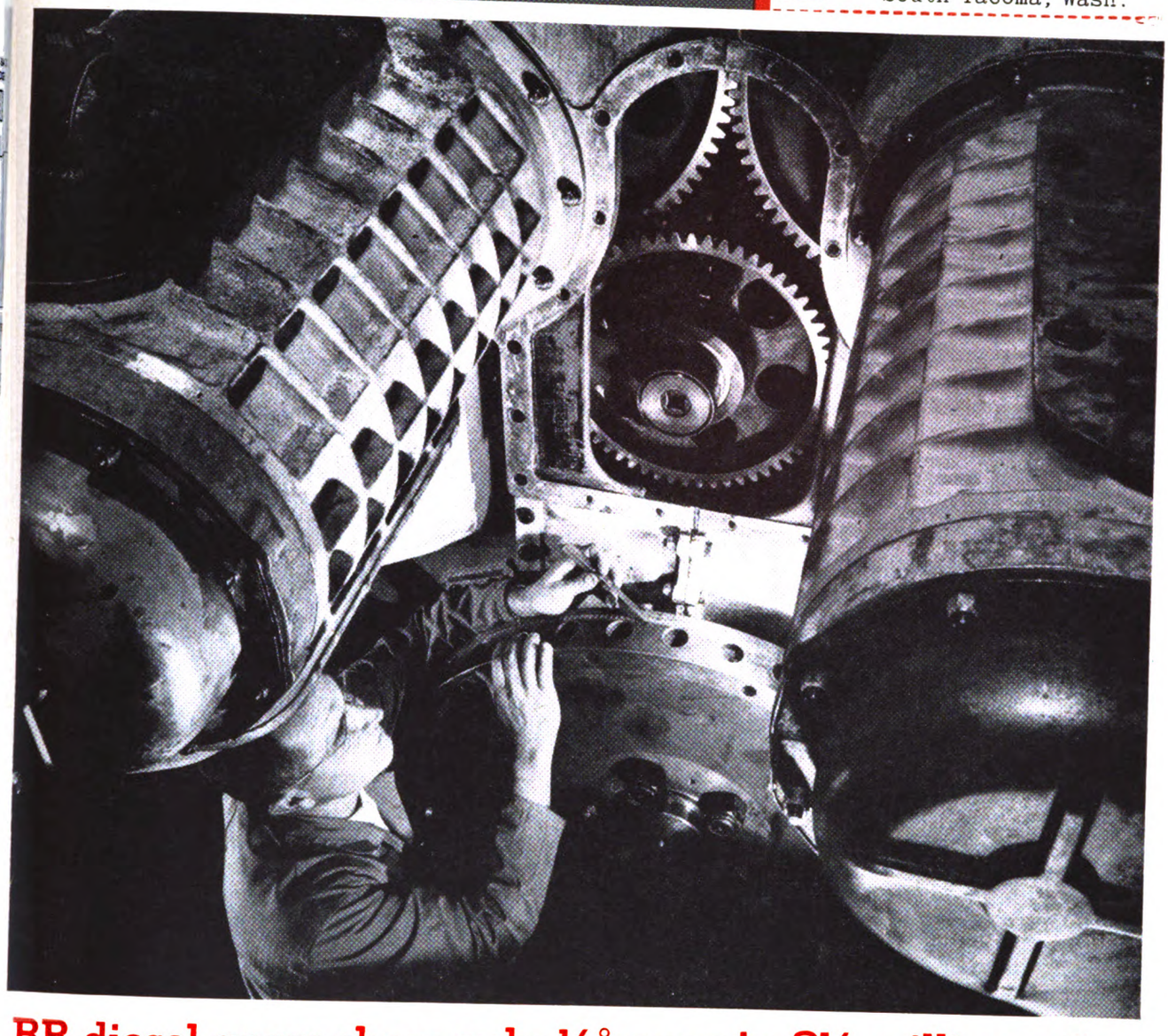
Just enough free and snubbed lateral movement has been designed into the cartridge bearing to minimize damaging impact on truck side frames and bolsters. Controlling the lateral movement also prevents the seal ring from riding off the axle dust guard seat. However, there is sufficient lateral so the sleeve can move in and out slightly on the axle, lubricating the entire journal surface under all conditions.

(Continued on page 8)

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

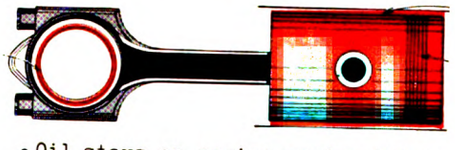
FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

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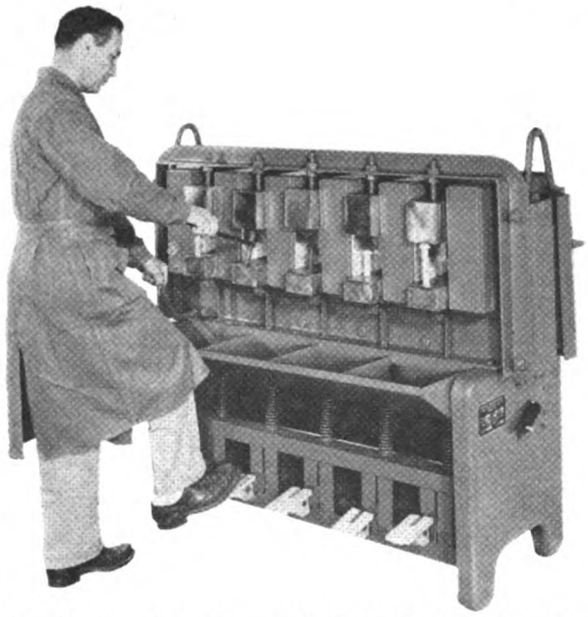
At work on the



No. 3—five electrode model, for high production positions—the real workhorse of the trade. Other models for heating two and three rivets at a time.

THE B&O USES CHESTON ELECTRIC RIVET HEATERS AT DU BOIS

In its busy shops at DuBois, the Baltimore and Ohio Railroad uses Cheston Electric Rivet Heaters because of the great economy and convenience built into our equipment . . . and because the cool, clean, quiet and entirely modern operation of the Cheston Heater is right for an up-to-date shop, and good for B&O employees.

The Cheston Rivet Heater is ready to go to work whenever . . . and wherever . . . the job is ready, and produces heated rivets within seconds of starting up. There is no waiting time loss while rivets come up to heat . . . no pre-heating expense before the shift begins . . . no fuel waste during idle periods. With a Cheston Rivet Heater there is no heat blast . . . blower roar . . . smoke . . . fumes . . . or grime. There is no fire hazard, as open hearths and fuel lines and stores are eliminated. No compressed air is required, so the air now lost to your blast type heaters is added to your tools for better quality work. Operating cost of a Cheston Rivet Heater averages out to about 15 cents per 100 lbs. of rivets heated. These features have made good sense to the B&O, and to scores of other railroads, large and small.

CHESTON ELECTRIC RIVET HEATERS
MAKE THE BEST SENSE FOR YOU, TOO.
WRITE FOR DETAILS TODAY.

Frank C. Cheston Company

60 Park Place — Newark 2, New Jersey

EQUIPMENT

(Continued from page 6)

Installing the new cartridge bearings requires no special shop equipment or training. Because the cartridge is a sleeve bearing, the axle collar is cut off so the sleeve can be slipped over the journal. Three holes are drilled and tapped in the end of the axle so the cartridge can be secured by a new removable collar held by cap screws.

The cartridge fits into the journal box after the dust guard well flanges have been cut off with a torch. A saturated lubricating pad is placed in the cartridge before it is installed, then it is slipped on the journal, and the adapter positioned atop the bearing. The front cover is bolted on, and oil to the proper gage level added to the reservoir through the self-closing filler cap. Since the cartridge bearing has its own cover, the standard journal box lid is not used.

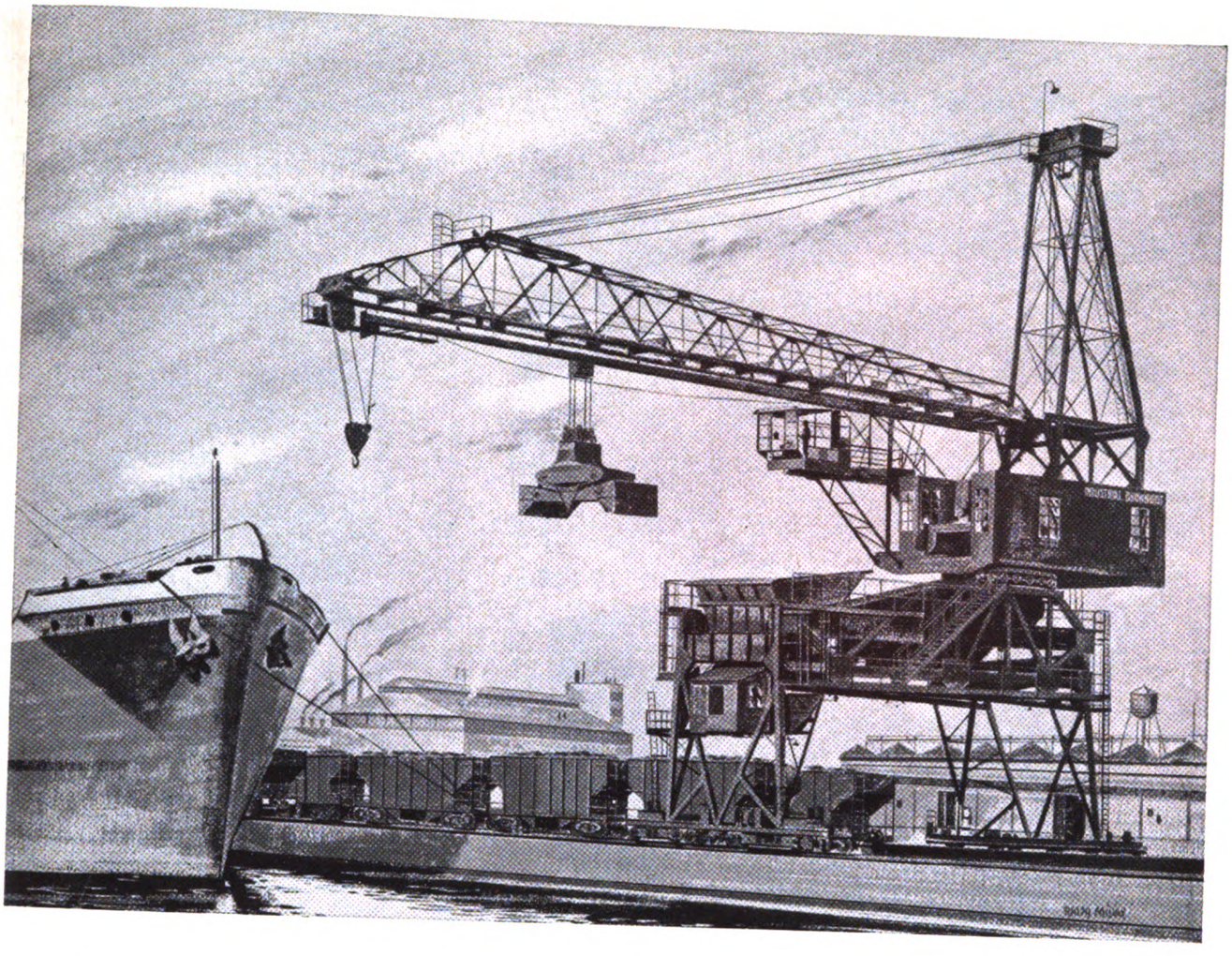
Cartridge bearings can be inserted in journal boxes at the wheel shops, where complete wheel, axle and cartridge sets can be made up in advance for assembly into trucks. At present Brake Shoe recommends an oil check and refilling if necessary after every 3,000 miles. Bearing surface, journal and lubricating pad can be inspected at wheel turning.

Besides aiming at elimination of the hot box problem, the new bearing has the added advantage of economy. Initially, it costs less than any type of roller bearing assembly, Brake Shoe claims. Cartridge bearings can be produced at lower cost primarily because each bearing is essentially an integral bronze casting and not an assembly of many critical parts.

Since cartridge bearings require infrequent service attention, eliminate waste grabs, and conserve oil, they substantially reduce operating costs. Finally, cartridge bearings have a low replacement cost because of their high salvage value. Over 75 per cent of the total weight of the unit is the bronze cartridge casting. The same toll return of scrap, now used for standard AAR journal bearings, will apply to cartridge bearings.

American Brake Shoe is currently producing the new cartridge bearings in its St. Louis, Mo., and Meadville, Pa., plants. Seven railroads

(Continued on page 10)



how 75 ton BROWNHOIST combination crane will greatly increase GALVESTON port facilities

The latest type combination boat-unloading crane being engineered and built by Industrial Brownhoist in Bay City, Michigan will substantially improve facilities in the Port of Galveston's 1957 expansion program.

This big, fast-working Brownhoist crane loads or unloads bulk materials from ship-to-cars or cars-to-ship at the remarkable rate of 540 tons per hour! Equipped with 75 foot boom, on which travel both a hook and a Brownhoist-made, 80 cubic foot flush link-type bucket. The entire unit straddles three railroad car tracks located on the pier.

In addition to boat unloading equipment and material handling bridges, Industrial Brownhoist manufactures Diesel-Electric locomotive cranes from 25 to 90 tons, and railroad cranes up to 250 ton capacities. If your firm can profit from reliable, high-speed, high-capacity material-handling equipment, write for new general Catalog No. 562.

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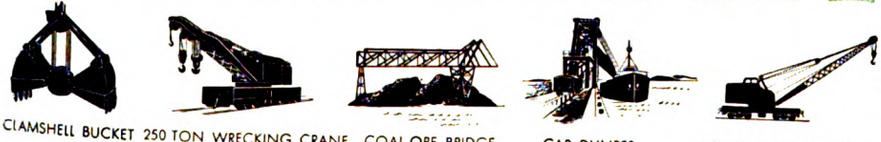

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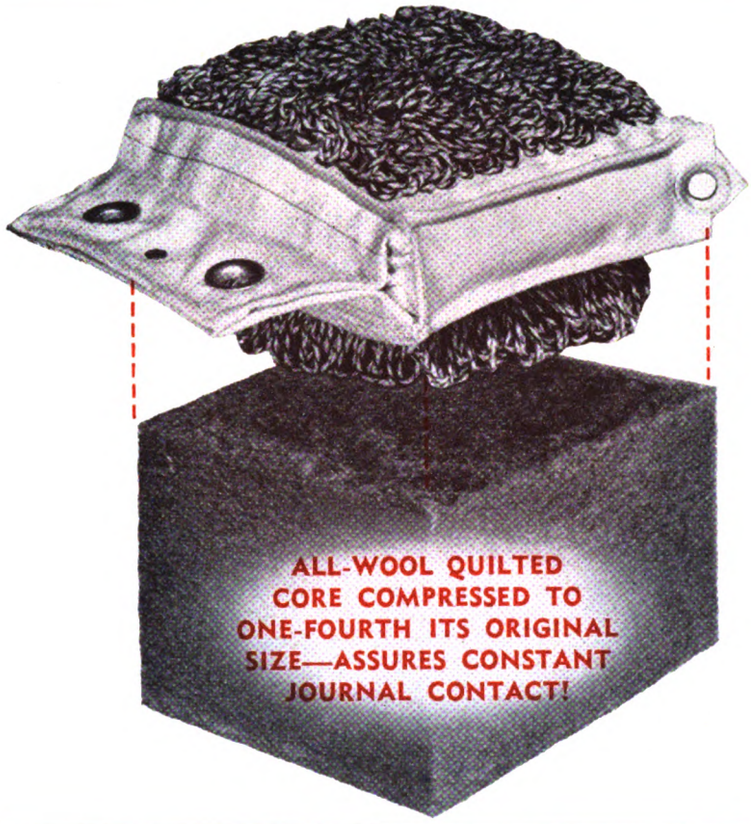

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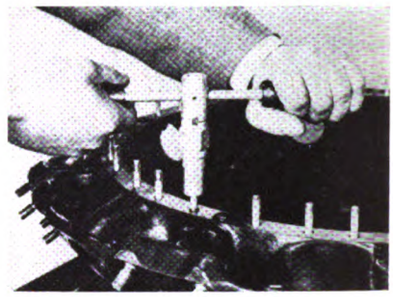
EQUIPMENT

(*Continued from page 8*)

already have the new cartridge bearings on trial or on order, their requirements ranging from bearings for single car tests to orders for more than 100 cars. *American Brake Shoe Company, Railroad Products Division, Dept. RLC, 230 Park ave., New York 17.*



Stud Driver-Extractor

The Bi-Way Studder, a double-duty extractor and driver for hand or power operation, is said to salvage more than five times as many studs in undamaged condition as comparable tools. Collet sizes are changed in less than 30 sec. Interlocking construction was adopted to prevent accidental misalignment, to seal out dirt, and to provide reliable operation.

In extracting, only the required clamping action to release the stud is produced to prevent stripping the thread. Lowering the shift control and reversing the direction of the rotation furnishes the driving action. Serrated collets are available to remove damaged studs, even if only as little as ⅛ in. of the stud can be gripped.

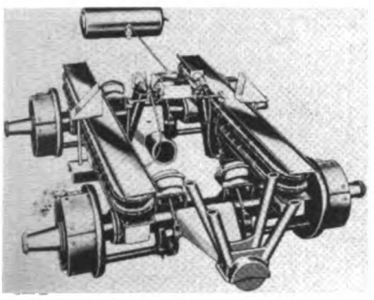
Removal of the handles converts this studder to power operation. Tool will accept all standard drive hand, torque, air, or electric impact wrenches with controlled impact. Extension shafts may be used for difficult applications. *E. V. Nielsen, Inc., Dept. RLC, 128 Broad st., Stamford, Conn.*

Self-heating Iron

A self-heating soldering iron is available in this cartridge heated tool called the Quik-Shot. A small cartridge when activated by a plunger in the handle, produces an excess of 800 deg F in the copper tip, providing 6 min of soldering time.

The manufacturer recommends this

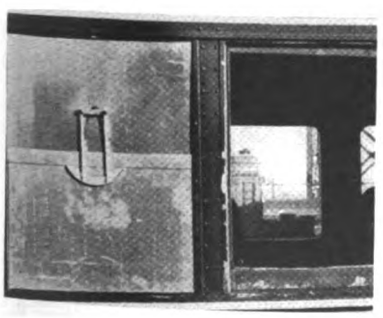
tool for work where no electric current is available or not convenient. A 1-in. chisel tip as well as four smaller-sized tips are offered. All tips are interchangeable and take the same cartridge. *Kemode Manufacturing Company, Inc., Dept. RLC, 161 W. 18th st., New York 11.*



Air Spring Suspension Unit

The Yocar AiRide, a new air spring suspension unit for truck-trailers, is a Youngstown Steel Car design. The first model—a tandem—incorporates several engineering advances designed to lighten the suspension unit by a considerable amount over conventional rigs.

The Yocar AiRide has an automatic compensating system which maintains axle-to-trailer floor height regardless of load or road conditions. The manufacturers say this feature alone, by reducing cost of running-gear maintenance and lowering damage freight claims, provides truckers with a long sought-after means of lowering operating costs. *Youngstown Steel Car Corporation, AiRide Division, Dept. RLC, Niles, Ohio.*



Window Mask

This paint-spraying mask or shield for railroad car windows eliminates the use of tape and is said to reduce preparation time to less than one minute. Standard size shields are stocked, and nearly any size can be ordered, also a modified style for rubber-mounted windows.

These self-adjusting masks of hard stock aluminum come in individual reinforced cartons, identified by type and size. *O'Neill Spray Shield Company, 1719 South 18th st., Dept. RLC, Philadelphia 45.*

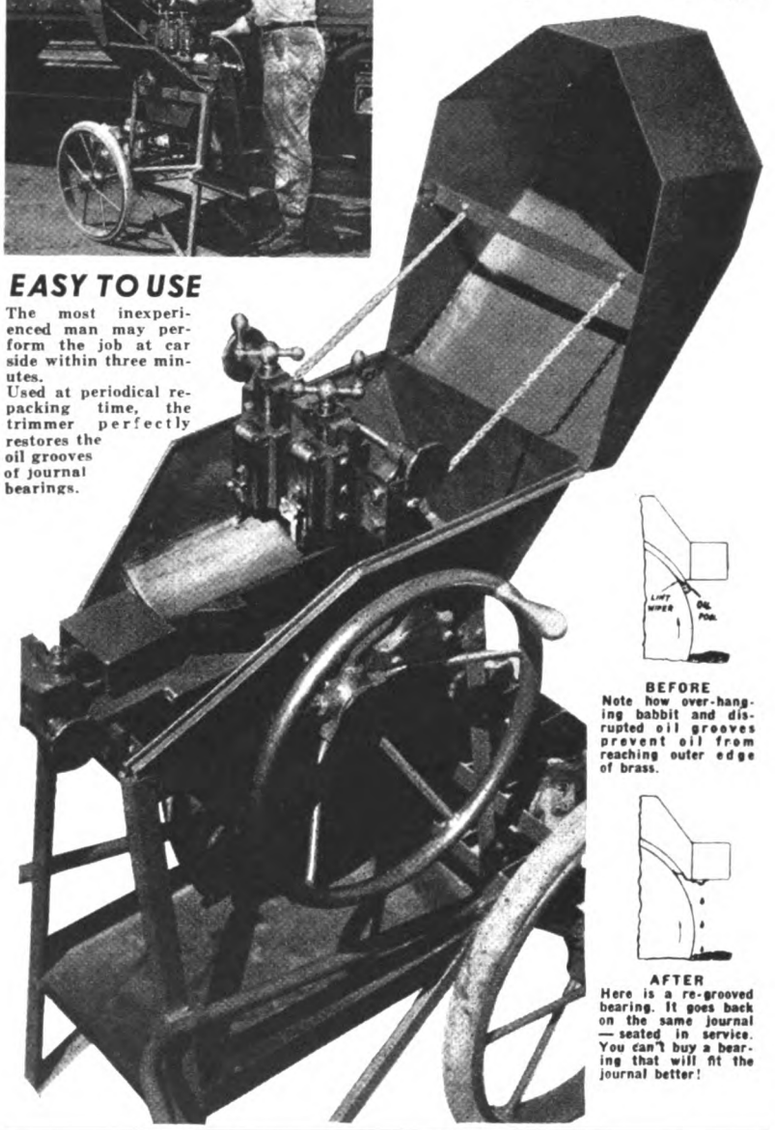
(Turn to page 76)

RENT or BUY . . .

THE FAMOUS **JBS** BRASS TRIMMER

SAVES $5.00 ANNUALLY PER CAR!*

*Many years of service records *verify* even greater savings!



EASY TO USE

The most inexperienced man may perform the job at car side within three minutes.

Used at periodical repacking time, the trimmer perfectly restores the oil grooves of journal bearings.

BEFORE

Note how over-hanging babbit and disrupted oil grooves prevent oil from reaching outer edge of brass.

AFTER

Here is a re-grooved bearing. It goes back on the same journal — seated in service. You can't buy a bearing that will fit the journal better!

BEARINGS BETTER THAN NEW!

ELIMINATES CRUCIAL BREAK-IN PERIOD

Trimming and reapplication to the journal from which removed results in the perfectly FITTED BEARING and eliminates the hazard of failure during the otherwise crucial break-in period of a new bearing.

AAR APPROVED

The trimming of bearings has been approved as a CHARGEABLE ITEM on cars in interchange.

JOURNAL BOX SERVICING CORPORATION

"30 Years in Car Lubrication"

Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.

General Office: 1112 E. Kessler Blvd., Indianapolis 20, Ind.

Mechanical Division Convenes June 25-27

The Mechanical Division, Association of American Railroads, will hold its 1957 convention at the Hotel Sherman, Chicago, June 25-27. Daylight Saving Time will be observed for the various sessions, the program for which follows.

TUESDAY, JUNE 25

10 am

Joint session: Mechanical Division and Electrical Section of the Mechanical and Engineering Divisions, addressed by J. W. Barringer, president, Pittsburgh & Lake Erie, and R. G. May, vice-president, Operations and Maintenance Department, AAR.

Address: C. E. Pond, general superintendent motive power, Norfolk & Western.

Action on Minutes of 1956 annual meeting.

Appointment of Committees on Subjects, Resolutions, etc.

Unfinished business.

New business.

Reports of General and Nominating Committees.

Discussion of reports on:

Locomotives.

Lubricants and Fuel for Diesel Locomotives.

Axles.

Geared Hand Brakes.

Specifications for Materials.

Safety Appliances.

WEDNESDAY, JUNE 26

9:30 am

Address: R. H. Smith, president, Norfolk & Western.

Discussion of reports on:

Arbitration.

Prices for Labor and Materials.

Car Construction.

Brakes and Brake Equipment.

Couplers and Draft Gears.

Loading Rules.

Forest Products Loading.

THURSDAY, JUNE 27

9:30 am

Address: Kenneth H. Tuggle, member, Interstate Commerce Commission.

Discussion of reports on:

Wheels.

Tank Cars.

Journal Roller Bearings.

Lubrication of Cars and Locomotives.

Election of members of General Committee and Committee on Nominations.

Report of Committee on Resolutions.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MAY ISSUE

FREIGHT-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Cap., Tons*	*Other detail*
BALTIMORE & OHIO:				
Bethlehem Steel	2,000	Hopper	70	For delivery late 1957 and early 1958.
CHICAGO & EASTERN ILLINOIS:				
Bethlehem Steel	50	Gondola	—	Length, 65 ft. Cost, about $500,000. Delivery expected first quarter 1958.
COTTON BELT:				
Bethlehem Steel	50	Gondola	70	Estimated cost, $450,250. For January delivery.
Pullman-Standard	100	Covered hopper	70	Estimated cost, $953,500. For October delivery.
FLORIDA EAST COAST:				
Magor Car	150	Gondola	70	For delivery first quarter 1958.
ACF Industries	50	Hopper	70	Both types of hoppers for delivery fourth quarter 1957.
Pullman-Standard	55	Covered hopper	70	Purchase of these 255 cars subject to court order.
NORTHERN PACIFIC:				
Company shops	500	Box	50	Length 50½ ft. with 15-ft. double doors. Estimated cost, $4,325,000. For delivery about next March.
	500	Box	50	Length, 40½ ft., with 6-ft. doors. Estimated cost, $4,075,000. For delivery about July or August 1958.
SEABOARD AIR LINE:				
Company shops	10	Box	—	Specially designed with 20-ft doors for handling packaged lumber. Delivery expected before end of year.
SOUTHERN:				
Pullman-Standard	1,200	Gondola	70	- ——
	200	Box	50	"Premium type."
	600	Covered hopper	70	- ——
ACF Industries	500	Hopper bottom coal	70	- ——
Greenville Steel Car	100	Drop-end gondola	70	——
General American	50	Covered hopper	70	"Airslide."
UNION PACIFIC:				
General American	100	Covered hopper	70	"Airslide."
UNION TANK CAR CO.:				
Company shops	10	Tank	—	10,000 gal. For delivery fourth quarter 1957.
WABASH:				
Bethlehem Steel	100	Gondola	70	For January delivery.
Greenville Steel Car	50	Covered hopper	70	For June delivery.

DIESEL LOCOMOTIVE ORDERS

Road and builder	*No. of units*	*Horse-power*	*Service*	*Other Detail*
PENNSYLVANIA:				
Electro-Motive	50	1,750	All-purpose freight	Approximate cost, $9,750,000. Delivery to be completed by October.

NOTES AND INQUIRIES

LOCOMOTIVES:

Pennsylvania.—Purchased seven retired electric locomotives from the Great Northern. All of Y-1 class, rated at 3,300 hp.

AIEE Summer General Meeting

Sessions on Suburban Electrification and Land Transportation are among those on the calendar for the Summer General Meeting of the American Institute of Electrical Engineers to be held at the Sheraton Mount Royal Hotel, Montreal, June 24-28. The papers to be presented at these two sessions are as follows.

MONDAY, JUNE 24

9 am

Land Transportation

Description and Maintenance Procedures of Electrical and Air-Conditioning Equipment on Canadian Pacific Stainless-Steel Passenger-Car Equipment, A. E. McGruer, Canadian Pacific.

Rehabilitation of Diesel-Electric Locomotive Electrical Equipment, T. H. Murphy and R. L. Bogardus, Westinghouse Electric Corp.

A New Void-Free, Class "H" Insulation System for Traction Motor Field Coils, G. L. Moses, Westinghouse Electric Corp., and S. MacBeth, Canadian Westinghouse Co.

Multiple-Unit Rectifier Motive Power Inductive-Coordination Considerations on the New York, New Haven & Hartford, L. J. Hibbard, Westinghouse Electric Corp., F. T. Garry, Southern New England Telephone Co., and G. N. Loomis, New Haven.

TUESDAY, JUNE 25

9 am

Suburban Electrification

Symposium on Electrification of Railway Commuter Service:

Part I—Problems Confronting Railway Commuter Service, T. F. Perkinson, General Electric Co.

Series Capacitors Applied to Rectifier Motive Power Units, L. J. Hibbard and T. J. Bliss, Westinghouse Electric Corp.

Part II—Factors Influencing Future

(*Continued on page 14*)

Name the load on your road

there's a Yellow Strand® Safety Sling to handle it!

Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

They can be tailor-made to specifically fit your needs. Just ask your Broderick & Bascom distributor, or write direct to us for specific sling information.

Diesel switch engine is safely and easily lifted with four M-1-AB Yellow Strand Braided Slings; each sling is 8 parts ¾" rope, 14 feet long.

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Manufacturers of Wire Rope for over 80 Years

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American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.

NEWS

(*Continued from page 12*)

Electrification of Railway Commuter Service, H. F. Brown, Gibbs & Hill, Inc. Conclusion—J. Stair, Jr., Pennsylvania.

2 pm

Land Transportation

Mercury-Arc Rectifiers in Urban Transportation, J. T. Harvey, Toronto Transit Commission.

Comparison of Aluminum and Steel Subway Cars, L. W. Bardsley, Toronto Transit Commission.

Ore haulage on the Quebec, North Shore & Laborador, J. H. Miller, QNS&L. With motion pictures.

NYC Reveals Gas-Turbine Research

A closed cycle gas turbine—a third candidate for future locomotive prime movers—has successfully operated with a thermal efficiency of 21 per cent at the New York Central's newly opened research laboratory at Cleveland, according to J. J. Wright, NYC's director of technical research. "If we are lucky, it will be in a locomotive in 25 weeks," predicted Mr. Wright in summarizing the present test-stand operation. Other competitors in this prime mover race, according to Mr. Wright, have been the open-cycle gas turbine of the Locomotive Development Committee and General Motor's free piston power plant.

The NYC power plant uses Freon as the working fluid and consists of a pressurized shell containing the turbine and generator, along with the separate external heat exchanger and a condenser. At the time of the laboratory opening, the power system had produced a shaft output of only 40 hp, with work still in early stages. At present it is being fired with diesel oil to avoid fuel complications, but the heat exchanger presents the possibility of using almost any grade of

(*Continued on page 91*)

Personal Mention

Chicago & Northwestern

Chicago

C. C. EHLERT appointed chief mechanical engineer.

F. R. MARVIN has been appointed assistant diesel supervisor with headquarters at Chicago

LEE N. HASKINS appointed assistant diesel supervisor.

Elgin, Joliet & Eastern

V. K. MILLER appointed industrial engineer, Chicago.

B. E. LEWIS appointed master mechanic, Gary, Ind.

(*Continued on page 64*)

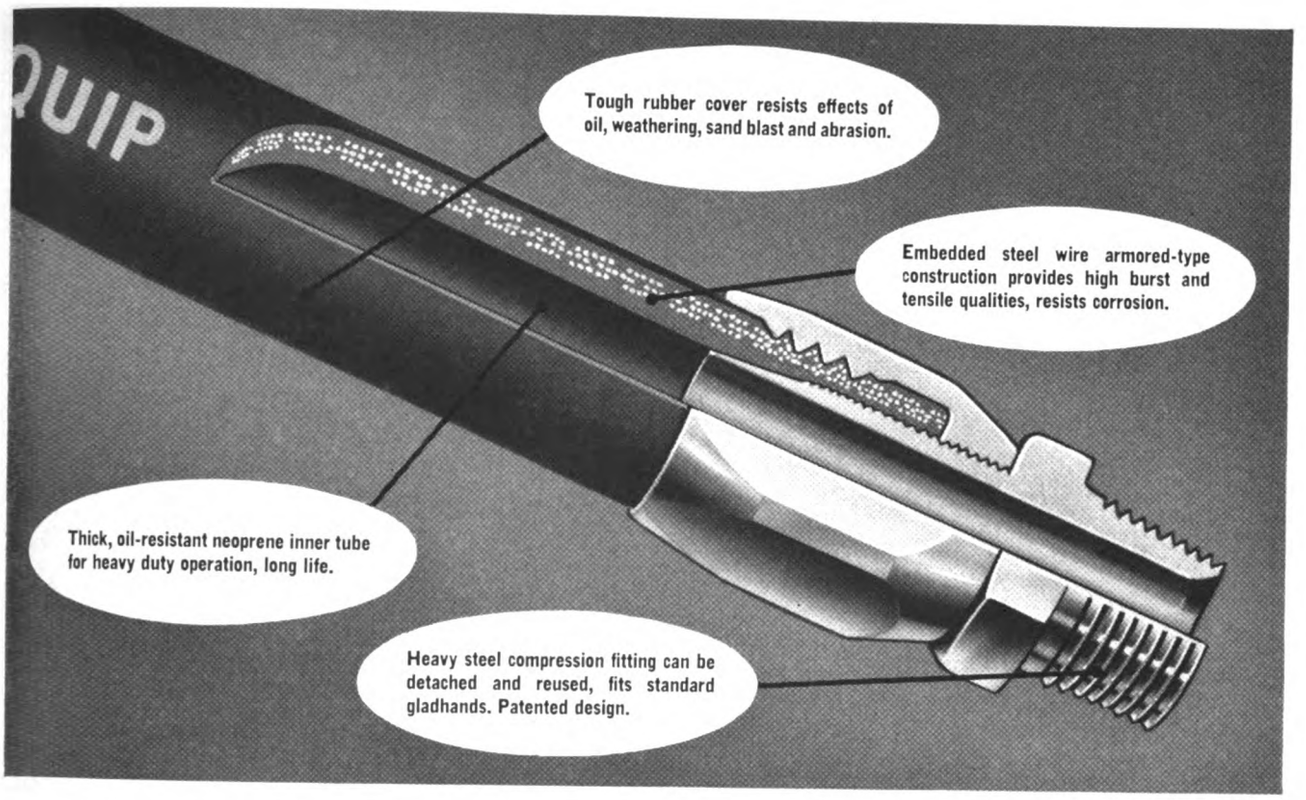
SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

Item No.		Month of February		2 months ended with February	
		1957	1956	1957	1956
FREIGTH SERVICE (DATA FROM I.C.C. M-211 AND M-240)					
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	2.163	4.113	4.733	8.712
3—06	Total, Diesel-electric	34.260	35.696	71.286	72.760
3—07	Total, electric	679	704	1.394	1.440
3—04	Total, locomotive-miles	37.329	40.731	77.904	83.374
4	Car-miles (000.000) (M-211):				
4—03	Loaded, total	1.501	1.623	3.071	3.287
4—06	Empty, total	873	876	1.803	1.833
6	Gross ton-miles-cars, contents and cabooses (000.000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	5.948	10.048	12.725	20.895
6—02	Total in oil-burning steam locomotive trains	128	962	363	2.372
6—03	Total in Diesel-electric locomotive trains	100.123	101.626	204.261	206.189
6—04	Total in electric locomotive trains	2.055	2.128	4.179	4.315
6—06	Total in all trains	109.093	115.519	223.321	235.295
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	42.9	42.8	42.1	42.4
10—03	Empty freight car-miles	25.0	23.1	24.7	23.6
10—04	Total freight car-miles excluding caboose)	67.9	65.9	66.8	66.0
10—05	Gross ton-miles (excluding locomotive and tender)	3.119	3.047	3.059	3.032
10—06	Net ton-miles	1.412	1.399	1.384	1.364
12	Net ton-miles per loaded car-mile (M-211)	32.9	32.7	32.9	32.7
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	63.2	64.9	63.0	64.2
14	Averages per train hour (M-211):				
14—01	Train miles	18.8	18.6	18.8	18.7
14—02	Gross ton-miles (excluding locomotive and tender)	58.132	56.074	56.889	56.051
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	45.8	46.9	44.7	46.4
17—02	All	44.1	45.0	43.0	44.5
18	Average net ton-miles per freight car-day (M-240)	918	955	890	934
20	Per cent of home cars of total freight cars on the line (M-240)	43.3	41.7	43.6	41.9
PASSENGER SERVICE (DATA FROM I.C.C. M-213)					
3	Road motive-power miles (000)				
3—05	Steam	300	806	717	1.806
3—06	Diesel-electric	18,024	19,374	38.312	40.114
3—07	Electric	1.110	1.222	2.369	2.545
3—04	Total	19.434	21.403	41.398	44.466
4	Passenger-train car-miles 000):				
4—08	Total in all locomotive-propelled trains	198.220	218.767	420.518	454.057
4—09	Total in coal-burning steam locomotive trains	2.292	4.813	5.404	10.706
4—10	Total in oil-burning steam locomotive trains	34	1.822	193	4.345
4—11	Total in Diesel-electric locomotive trains	182.252	197.022	386.349	408.879
12	Total car-miles per train-mile:	9.70	9.80	9.68	9.80
YARD SERVICE (DATA FROM I.C.C. M-215)					
1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	156.238	243.213	336.757	502.805
1—02	Steam, oil-burning	5.379	25.717	13.250	54.650
1—03	Diesel-electric[1]	3.554.874	3.738.334	7.483.799	7.633.514
1—06	Total	3.719.183	4.010.171	7.839.941	8.196.976
2	Passenger yard switching hours				
2—01	Steam coal-burning	4.032	6.465	8.846	14.185
2—02	Steam, oil-burning	119	2.285	804	5.625
2—03	Diesel-electric[1]	228.448	238.842	485.245	490.912
2—06	Total	255.106	272.604	543.174	562.218
3	Hours per yard locomotive-day:				
3—01	Steam	5.8	6.0	6.0	6.0
3—02	Diesel-electric	15.7	16.2	15.6	15.9
3—05	Serviceable	15.9	16.2	15.9	16.0
3—06	All locomotives serviceable, unserviceable and stored)	14.6	14.5	14.6	14.3
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.71	1.71	1.76	1.72
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.79	.79	.79	.76

[1] Excludes B and trailing A units

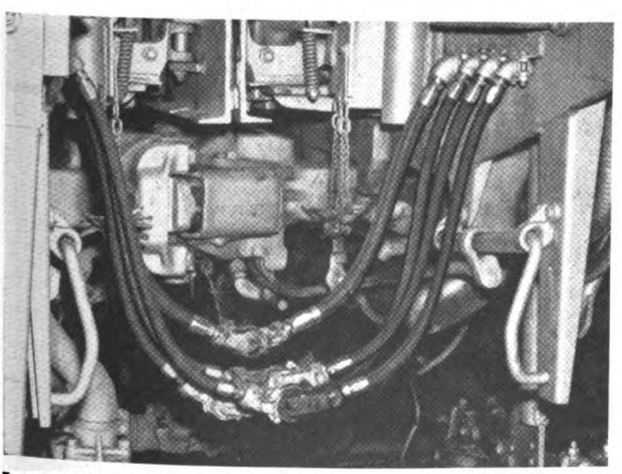
SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
February, 1953	2.625.563	2.111	4.059	6.170	425.537
February, 1954	2.445.215	2.953	4.066	7.019	385.370
February, 1955	2.517.483	2.266	3.970	6.236	403.701
1956					
January	2.925.109	2.029	4.302	6.331	462.029
February	2.794.161	2.570	5.611	8.181	341.542
March	3.027.684	2.517	6.212	8.729	346.853
April	2.930.389	3.202	6.881	10.083	290.628
May	3.063.427	4.672	10.903	15.575	196.648
June	2.973.732	6.777	15.125	21.902	135.774
July	2.788.347	8.484	16.067	24.551	189.573
August	3.039.173	9.891	16.892	26.783	113.474
September	2.918.875	6.834	12.629	19.463	148.970
October	3.113.460	4.357	8.429	12.786	243.505
November	2.953.625	2.650	5.560	8.210	359.745
December	2.933.940	2.256	4.436	6.692	438.425
1957					
January	2.767.060	3.373	6.121	9.494	291.455
February	2.675.265	3.272	6.844	10.113	264.558



Use Aeroquip Air Brake Hose Lines

TO CUT COSTS, REDUCE INVENTORY, SAVE TIME



Typical installation showing Aeroquip 1951 Air Brake Hose Lines used between passenger cars of a major railroad. The Aeroquip Fittings are detachable and reusable . . . fit standard gladhands.

Cut Replacement Costs—Aeroquip 1531 Air Brake Hose Lines give you the double advantage of low initial cost plus detachable fittings that can be used again and again. This can save you thousands of dollars each year on locomotive and passenger car air brake lines.

Reduce Inventory—With Aeroquip, your air brake hose line inventory is reduced to a few coils of bulk hose and some reusable fittings in your maintenance shops.

Save Time—Air brake lines can be made quickly, as they are needed. Just cut the Aeroquip Hose to length and attach the reusable fittings with hand tools. Aeroquip Hose Lines also save inspection time on your equipment. A standard test and a visual check at the end of a run reveals possible trouble spots. Write for full information on Aeroquip Air Brake Hose Lines plus High and Medium Pressure Hose Lines and Diesel Fueling Couplings.

Aeroquip

REG. TRADEMARK

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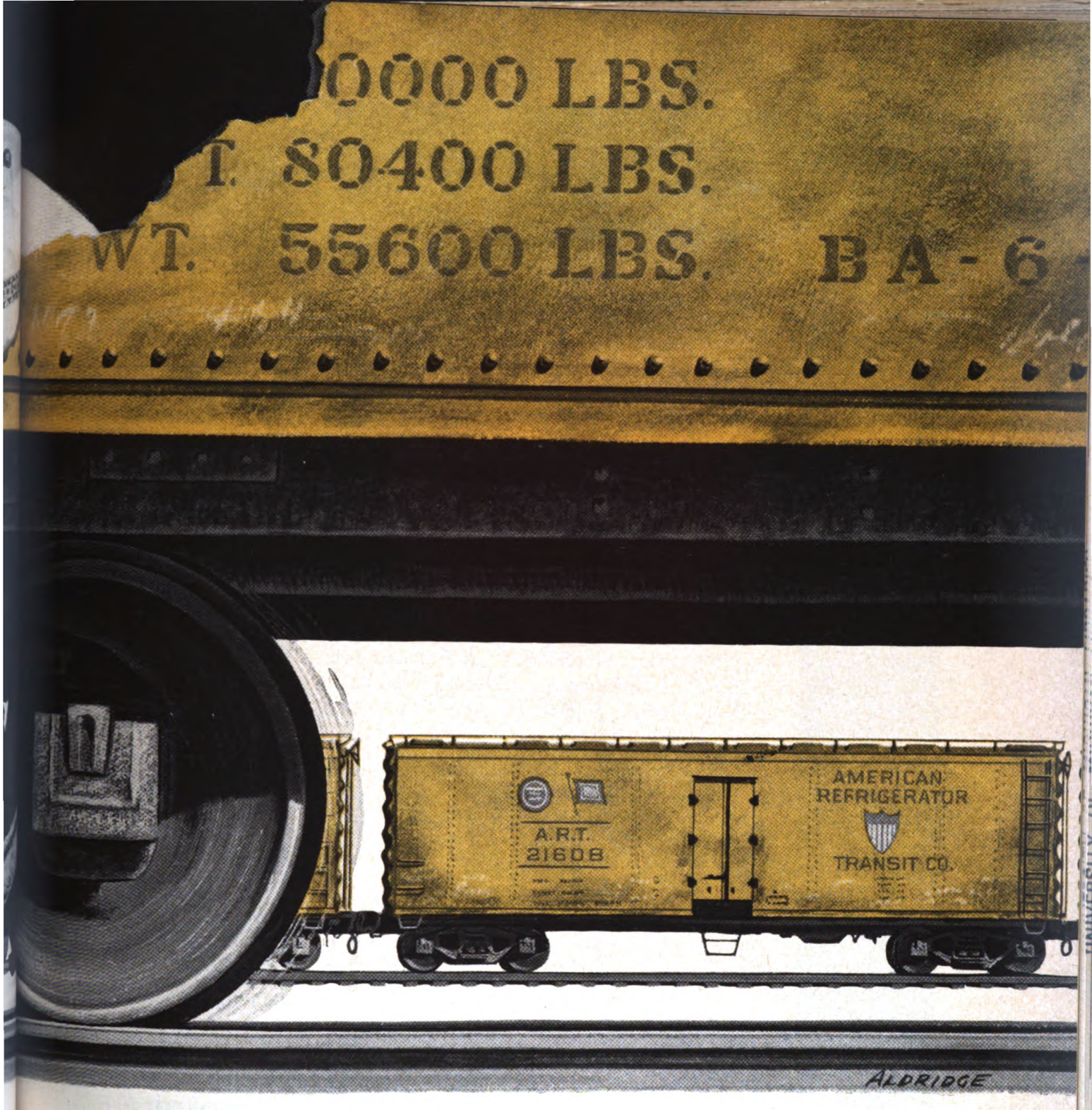
On the A.R.T.
THEY WHET YOUR APPETITE

At any fruit or vegetable counter, the biggest sales-builder of all is the "just-picked" look. That's why the A. R. T. Company has done such a topflight job of providing cars that ride smoothly at higher speeds . . . to bring produce from the orchards and farms to your dinner table safely and quickly.

Is this good service possible only with new cars? Not at all. Older cars—with trucks dating back to the pre-Ride-Control era—are simply brought up to modern riding standards with ASF Ride-Control Packages. Change-over takes only a few minutes and the investment is small—practically nothing, in fact, compared with the way *improved service* retains and *regains* freight revenues.

Safe, prompt arrival of *any* commodity carried on the rails is just as important and desirable as a fresh-looking orange! Further tests on your road will prove how Packages can help you increase *profits* . . . through greater car utilization, better service, fewer damage claims.

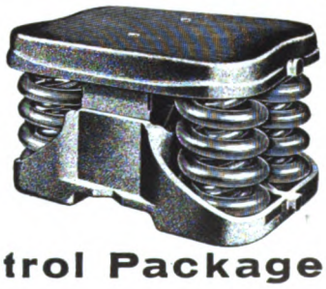
Now is the time to make smooth riding another objective of your general repairs program!



WITH SMOOTH-RIDING CARS!

NOW . . . all ASF Ride-Control Packages are fitted with Extended Life Springs

In appearance, these springs look like any standard truck spring . . . but tests prove they average at least 10 times longer life! Ride-Control Packages offer you a quick answer to smoother riding—and an answer to costly spring failures and replacement.



Bring your older cars up to modern riding standards . . . with

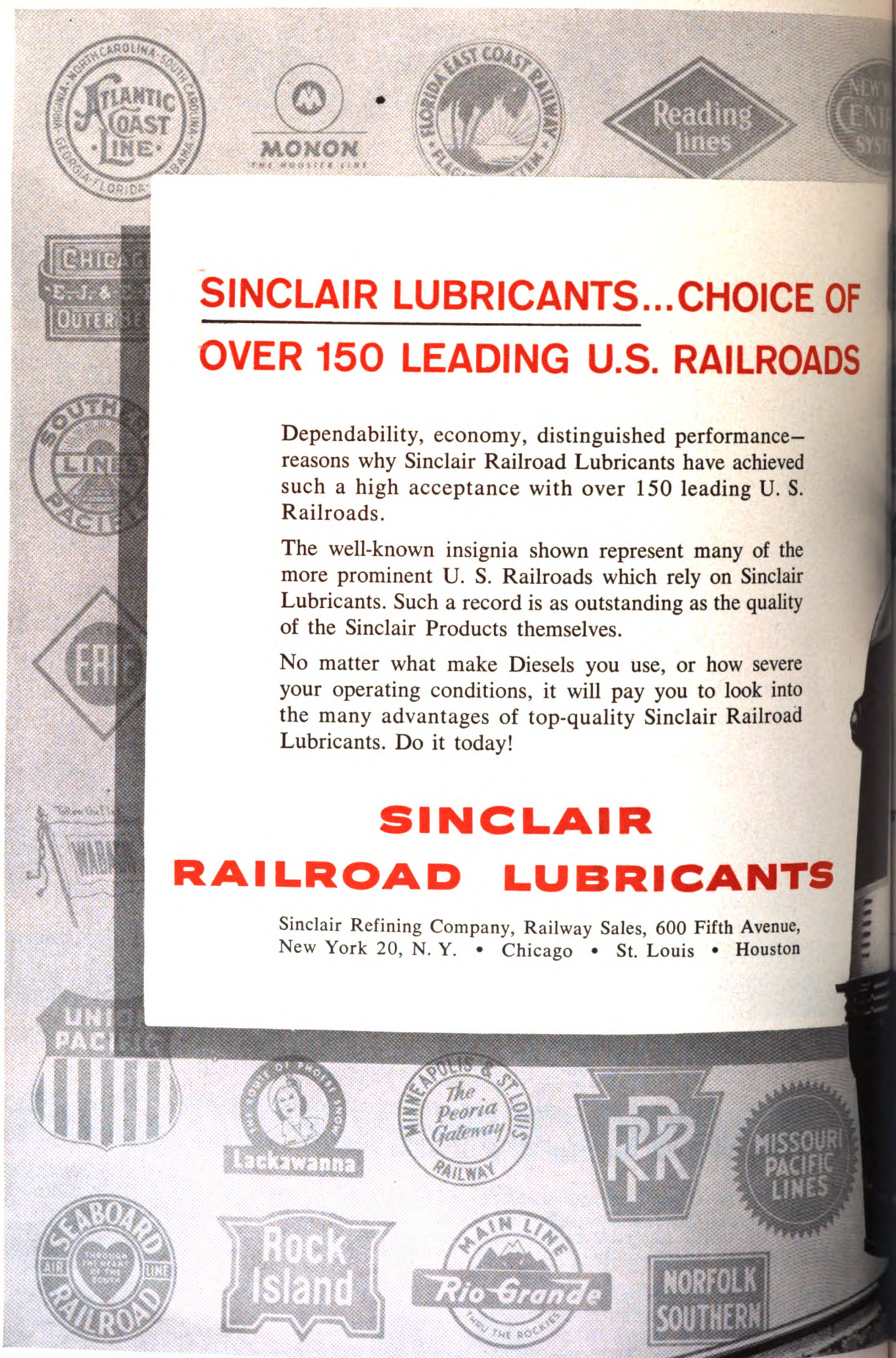
ASF Ride-Control Packages

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

PIB MEMBER



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Dependability, economy, distinguished performance—reasons why Sinclair Railroad Lubricants have achieved such a high acceptance with over 150 leading U. S. Railroads.

The well-known insignia shown represent many of the more prominent U. S. Railroads which rely on Sinclair Lubricants. Such a record is as outstanding as the quality of the Sinclair Products themselves.

No matter what make Diesels you use, or how severe your operating conditions, it will pay you to look into the many advantages of top-quality Sinclair Railroad Lubricants. Do it today!

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CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
THE SOUTHERN SERVES THE SOUTH
C&EI
CHICAGO & ILLINOIS MIDLAND
Lehigh Valley Railroad
W.S. SOUTHBOUND RY.
CHICAGO AND NORTH WESTERN SYSTEM
M-K-T
ILLINOIS CENTRAL
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SERVING 13 GREAT STATES WITH THE NATION

The world of science behind
EXIDE-IRONCLAD BATTERIES

Being interviewed is Curtice C. White, Senior Development Engineer.

"These channels actually cool the battery"

At the Exide Laboratories—**Reporter:** First, Mr. White, tell me what makes a battery hot.

White: Heavy loads—they often raise battery temperature as much as 20 degrees.

Reporter: How do the channels cool it?

White: The heated electrolyte rises to the top through the channels. Plates are cooled by electrolyte coming up from the bottom.

Reporter: Don't all batteries have channels?

White: Unfortunately, no. It is the tubular construction of the Exide-Ironclad positive plate that leaves these channels on both sides.

Reporter: What does this feature mean in battery performance?

White: Longer battery life, for one thing. The battery stays cooler. Has less incidence of hot spots. Plates operate at a more uniform temperature.

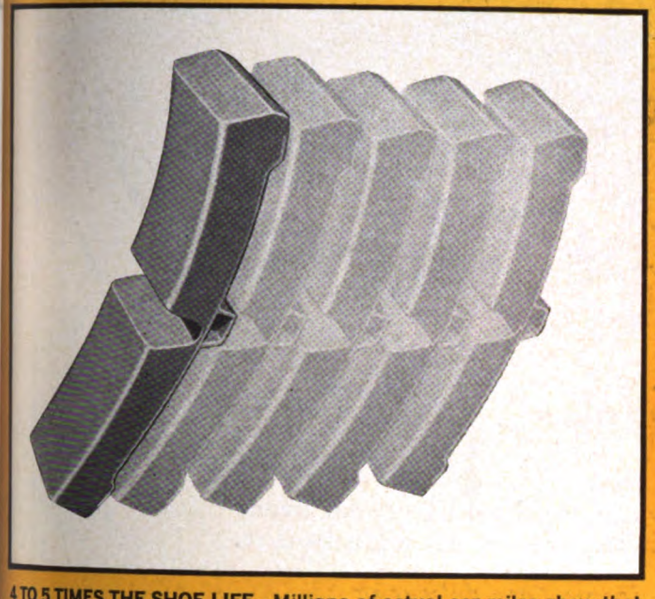
Reporter: Obviously this is an important feature of Exide-Ironclad.

White: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

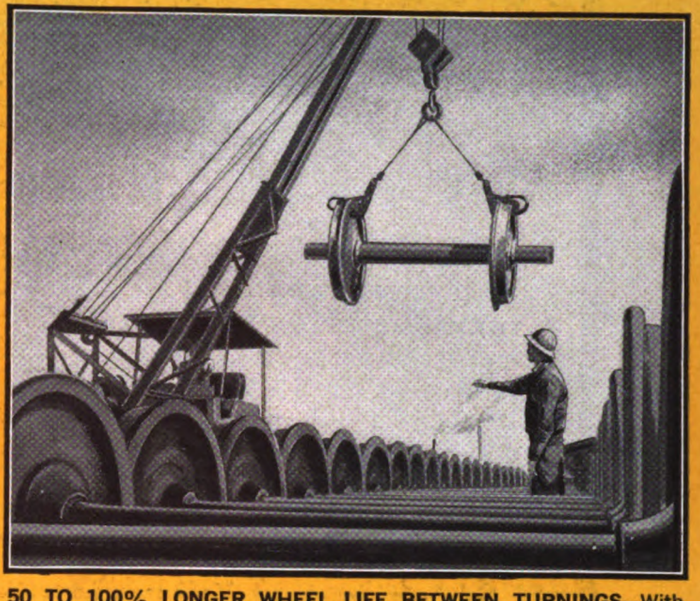
Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY **Exide®**

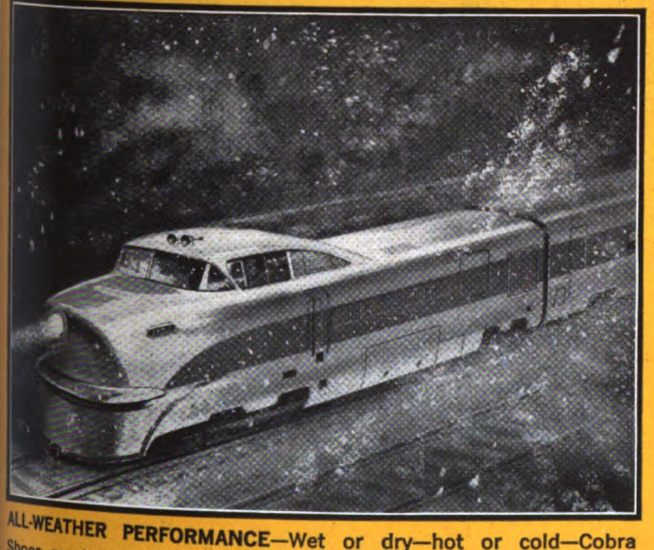
COBRA* SHOES offer 4 Major Advantages



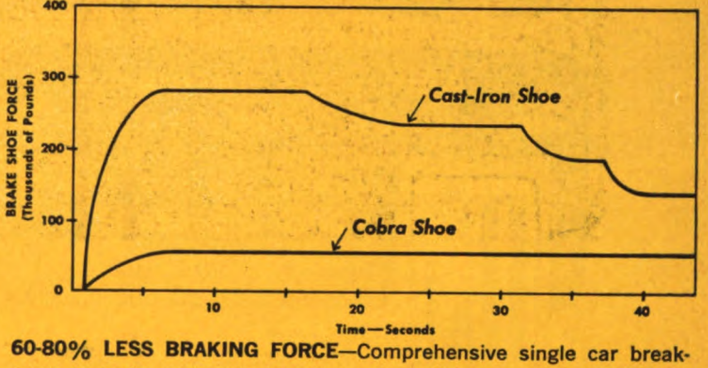
4 TO 5 TIMES THE SHOE LIFE—Millions of actual car-miles show that Cobra Shoes last four to five times as long as cast-iron shoes under matched conditions.



50 TO 100% LONGER WHEEL LIFE BETWEEN TURNINGS—With braking performance matched, wheel life between turnings has consistently averaged 50 to 100% more in favor of the Cobra Shoe.



ALL-WEATHER PERFORMANCE—Wet or dry—hot or cold—Cobra Shoes meet existing standards for stopping distances. Proved in actual railroad service.



60-80% LESS BRAKING FORCE—Comprehensive single car breakaway test shows the higher Cobra Shoe friction requires 60-80% less braking force than cast-iron shoes for equivalent retardation. Lower braking forces permit simplification and weight reduction of brake rigging and related components.

Result: *Savings up to $1400 per passenger car per year.*

*Registered U. S. Trademark—Composition Brake Shoe

The COBRA* SHOE — product of the combined research facilities of

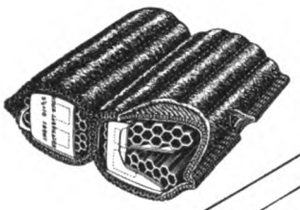
Westinghouse Air Brake Company *Specialists in Braking*

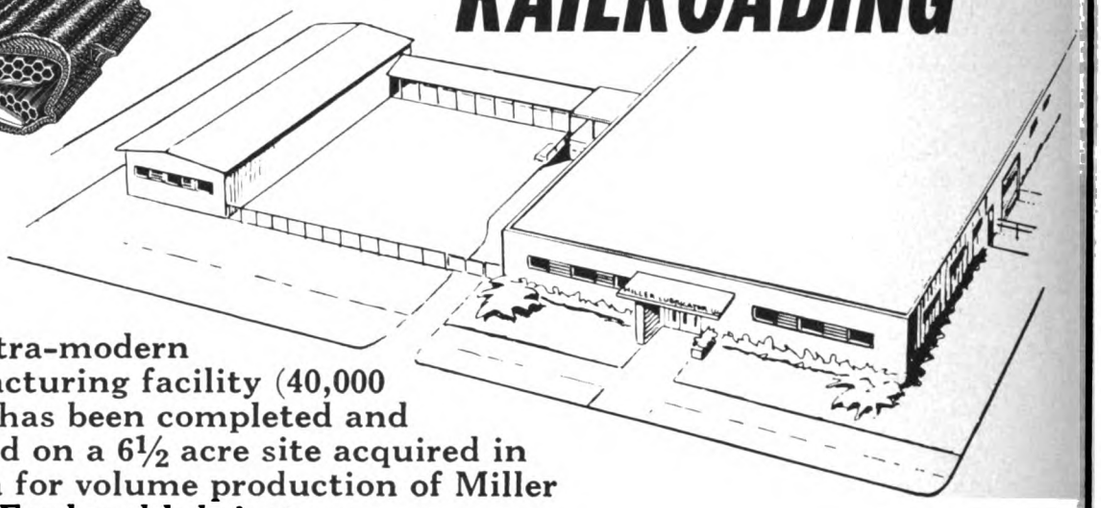
Johns-Manville *Specialists in Friction Materials*

RAILROAD FRICTION PRODUCTS CORPORATION, Wilmerding, Pennsylvania

86,000 CARSETS TO DATE

FOR PROGRESSIVE RAILROADING





This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller **Center Feed pad lubricators.**

Additional production capacity is now on hand to meet every railroad requirement placed with us, regardless of amount.

- *Volume quantities—immediate delivery*
- *Cost—$40 per carset (for all sizes)*
- *Life expectancy—6 years*

MILLER LUBRICATOR CO., WINONA, MINN.

America's foremost engineered lettering tools

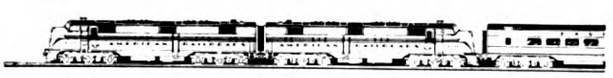
designed to reduce your present costs **50 to 80%**

Used today by 1/3rd of the Nation's leading Railroads . .

DN

Spray it— **STENCILS**

PRESSURE SENSITIVE TYPES



Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

THE DEMP-NOCK COMPANY

21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.

DEMP NOCK

How Metallizing saves money in railroad shops

"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scatches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

Some of the 28 major railroads using Metallizing:

A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

METCO

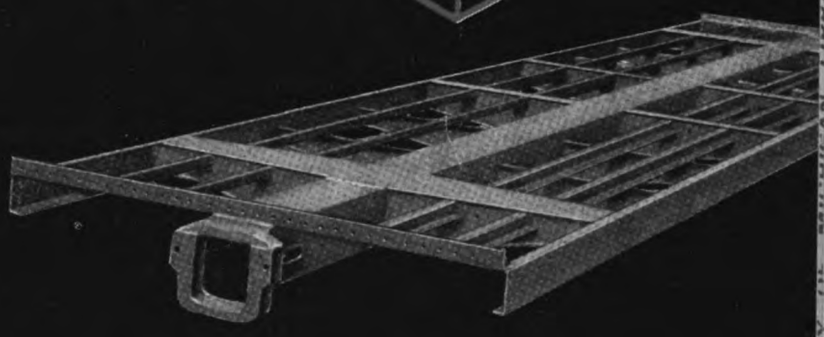
Metallizing Engineering Co., Inc.

1117 Prospect Ave., Westbury, L. I., New York • cable: METCO

In Great Britain: Telephone: EDGEWOOD 4-1300

METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

this is the backbone of the very finest freight car in the world



We don't know what "brand" of freight car this is—nor do we care—because WE ARE NOT CAR BUILDERS

. . . but we do know that a man who knows enough about underframes to specify this one could not build anything less than the very finest freight car in the world!

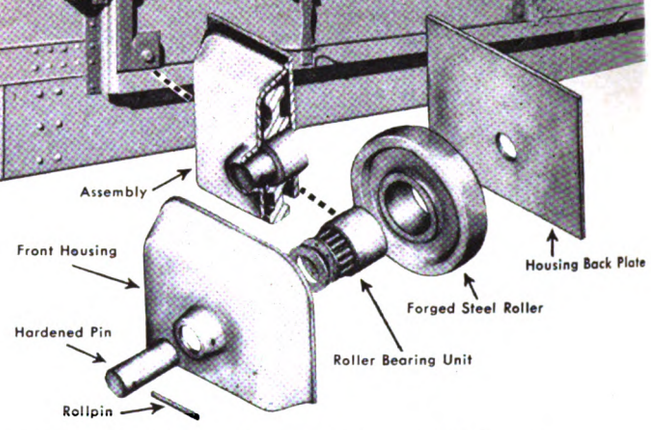
INTERNATIONAL STEEL COMPANY
RAILROAD DIVISION • EVANSVILLE 7, INDIANA

Precision fabricators of correctively designed components:
UNDERFRAMES . . . SIDE ASSEMBLIES . . . DOORS . . . BULKHEADS . . . FLOORS . . . HOPPERS

165,000 *opening and closing cycles . . .*

75,000 *severe roller impacts—couldn't put this door out of business*

PULLMAN-STANDARD BOX CAR SIDE DOORS



- Sizes: 9′ 11″ or specified height. 6′, 7′, 8′, 9′, 15′ or specified width.
- Heavy-duty lower combination panel and framing member of 7/12″ corrosion resistant, copper bearing steel to withstand loading dock abuse.
- Other panels of .10-inch corrosion-resistant copper-bearing steel. Fixtures of forged or cast steel to withstand service abuse. All parts can be repaired by welding if accident damaged.
- 5″ rollers with durable cage type roller bearings insure trouble-free, easy operation.
- Precision fabricated, embossed for strength.
- Corrosion pockets eliminated by welding assembly.
- All around sealing arrangement excludes dirt and weather, safeguards lading.
- Self-protecting design and fabrication excellence provide for long life, easy maintenance.

Over nine years ago, Pullman-Standard, the world's largest carbuilder, began the development of the P-S Box Car Side Door. Extensive field research determined the lading protection qualities, durability requirements and minimum maintenance features that shippers and railroads demand. P-S freight car engineering and production specialists applied these performance demands to the design and precision fabrication of this outstanding door now offered America's railroads.

Exhaustive laboratory and in-service tests have proved that the P-S Box Car Side Door exceeds even the rigorous demands that the Great American Railway System must make for top performance. One continuing laboratory test of the door roller mechanism and door track has put the P-S door through 165,000 opening and closing cycles. Another subjected the rollers and bearings to over 75,000 individual heavy impacts. Result: not a damaged bearing, rollers were still "in-round," door track was groove-free and door action remained smooth and easy.

Complete details and specifications on the P-S Box Car Side Door are available from your nearest Pullman-Standard Sales Office or by writing to the address below.

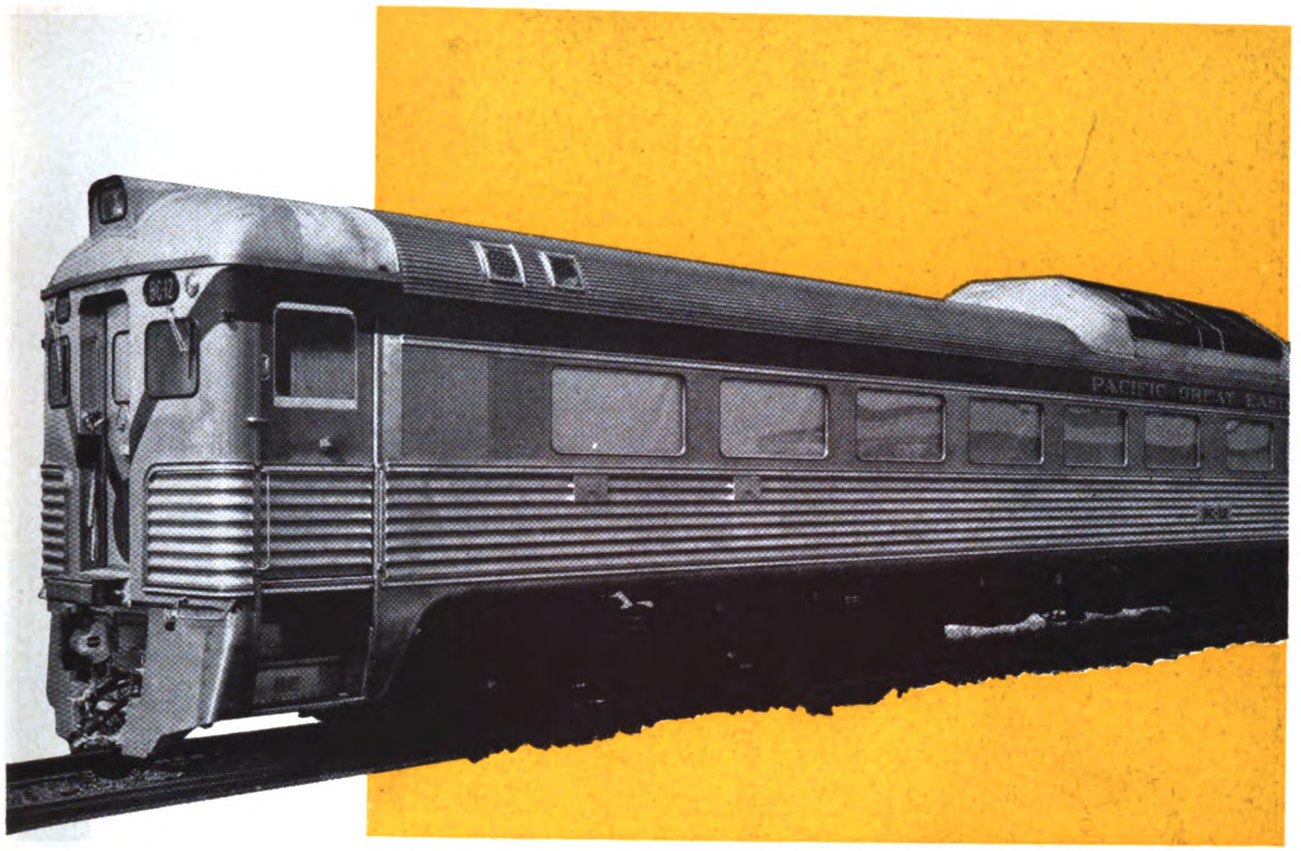
WORLD'S LARGEST BUILDER OF ROLLING STOCK

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON



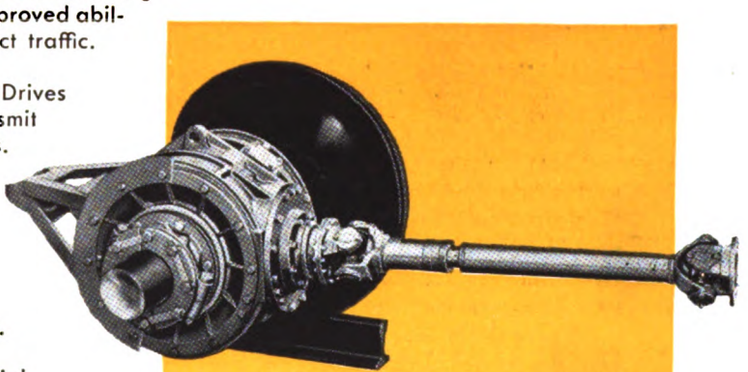
Budd uses the Spicer Drive for swift, economical Rail Car service

Budd Rail Diesel Cars are being adopted in ever-increasing numbers throughout the world because of their proved ability to reduce costs, improve service and attract traffic.

These Budd cars are equipped with two Spicer Drives that mount directly on the axles, and transmit power from the diesel engines to the wheels.

The Spicer Drive is a self-contained unit employing ground spiral bevel gears, with all wearing parts running in a constant bath of oil, completely sealed and protected from ballast, dirt, water, snow, etc., for long life and freedom from maintenance.

This unit incorporates the same features of high efficiency, economy, safety, quietness, and smoothness associated with over 12,000 Spicer positive generator drives in use on railway Pullman coaches, diners, and other rolling stock throughout America.



The Spicer Model 8 Drive as used in Budd Rail Diesel Cars.

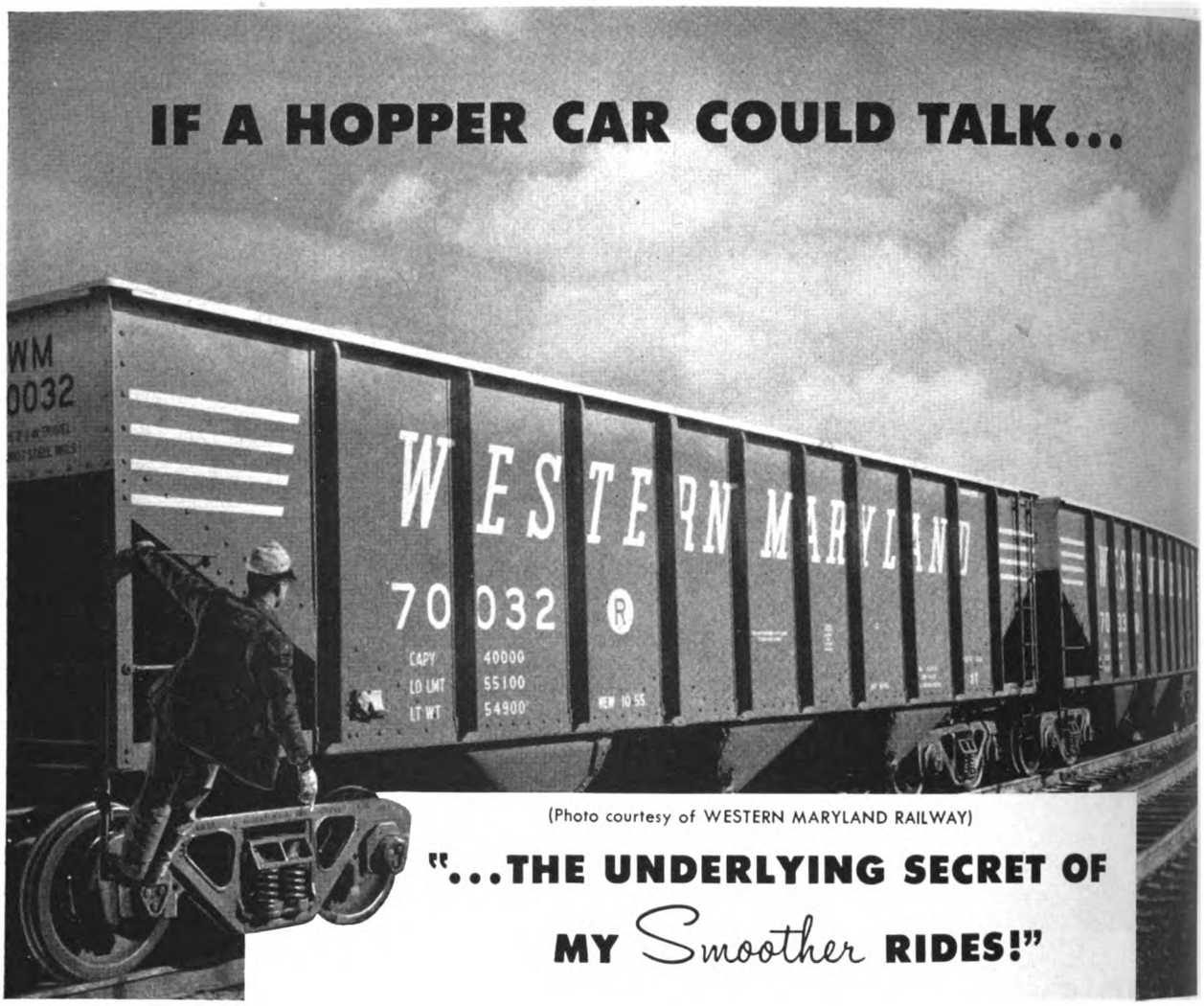
Spicer

DANA CORPORATION

TOLEDO 1, OHIO

SPICER PRODUCTS: Transmissions • Universal Joints • Propeller Shafts • Axles • Torque Converters • Gear Boxes • Power Take-Offs • Power Take-Off Joints • Rail Car Drives • Railway Generator Drives • Stampings • Spicer and Auburn Clutches • Parish Frames • Spicer Frames

IF A HOPPER CAR COULD TALK...



(Photo courtesy of WESTERN MARYLAND RAILWAY)

"...THE UNDERLYING SECRET OF MY *Smoother* RIDES!"

"I'm a Western Maryland triple-hopper car. I carry coal to light the nation's homes and turn its wheels of industry. I'm new in this business because the company just recently put me 'on the line.'

"But, already, I'm proud. Besides giving me the beauty of modern design, Western Maryland planned my future by providing me with the *best* of equipment. In exchange, I'll give them years of excellent, low-cost service.

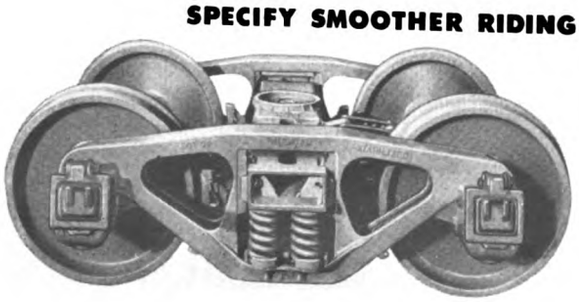
"I especially like to rest and ride on my sturdy dependable Barber *Stabilized* Trucks. Barber introduced them . . . 25 years of research and development have kept them modern.

"Because I like to keep on the go, I was happy to learn that Barber Stabilized Trucks are the easiest and quickest of any truck to dismantle, service and assemble with no special tools.

"Very important to me is the fact that Barber Stabilized Trucks protect my body, underframe and costly cast-steel parts by their ever-ready . . . yet simple and effective . . . system of suspension which allows them to absorb dangerous, destructive road shocks.

"I like to *rest* and *ride* on my Barber Stabilized Trucks!"

SPECIFY SMOOTHER RIDING

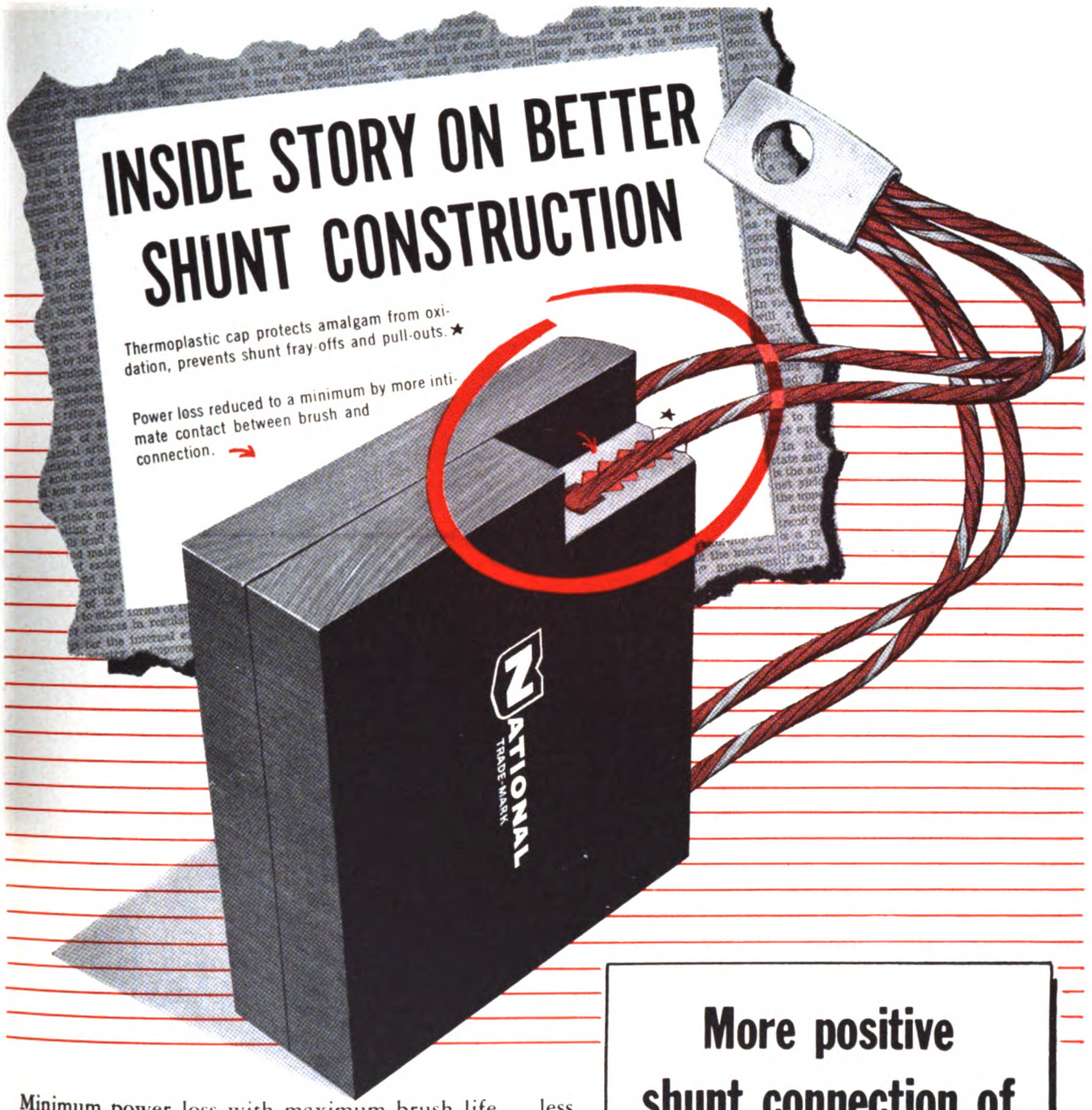


BARBER

STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

INSIDE STORY ON BETTER SHUNT CONSTRUCTION



Minimum power loss with maximum brush life . . . less down time for maintenance . . . top performance under widely varying road conditions. You can count on all these advantages with "National" brushes because their tamped, plastic-protected shunt connection offers the lowest possible resistance to current flow.

All grades and construction features of "National" brushes are proved in road operation before being offered for regular service. You can always depend on them for superior commutation ability, excellent commutator condition *with* long life.

NATIONAL BRUSHES Best for all types of equipment . . . preferred for all types of service. Order through your equipment manufacturer.

More positive shunt connection of

NATIONAL TRADE MARK **BRUSHES**

gives greater operating economy

The term "National" and the Silver Colored Cable Strand are registered trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY • **Division of Union Carbide Corporation** • ***30 East 42nd Street, New York 17, N. Y.***

Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

General Electric Locomotive Cables
wherever overloads are a problem

Steep grades and heavy hauls often mean overloads on locomotive cables. In conditions such as these, insulation to withstand the resultant high copper temperatures without deteriorating is required. That's one of the outstanding advantages you get by rewiring with General Electric Versatol* Geoprene* locomotive cable.

Another is this cable's ability to stand up under other severe operating conditions. The tough, neoprene-base jacket will withstand flying pebbles, abrasion, vibration, flexing, and attack from such corrosive agents as oils, steam, detergents, and other cleaning compounds.

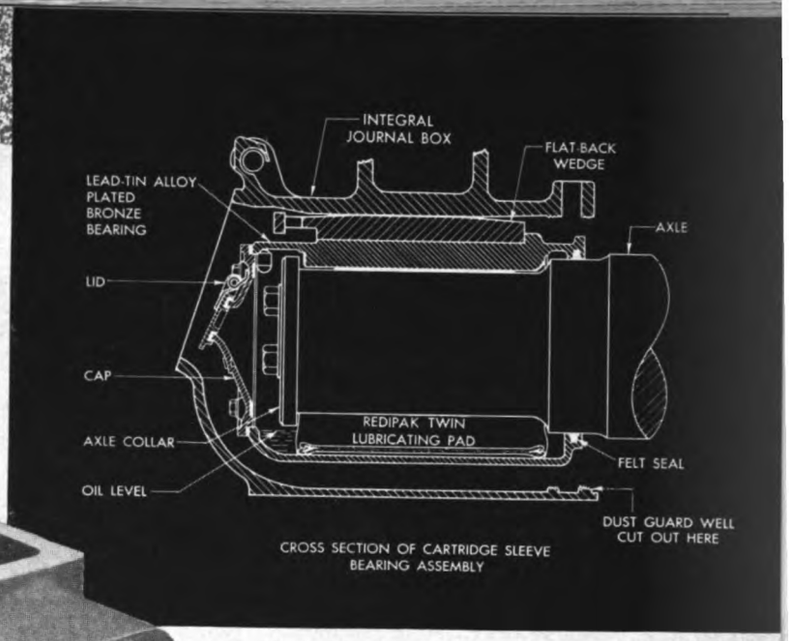
You get immediate delivery service, too, because Versatol Geoprene is stocked in a variety of types for all applications (even extreme temperature) right in conveniently located warehouses. For more information, write Section W214-647,, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

**Registered Trade-mark General Electric Company.*

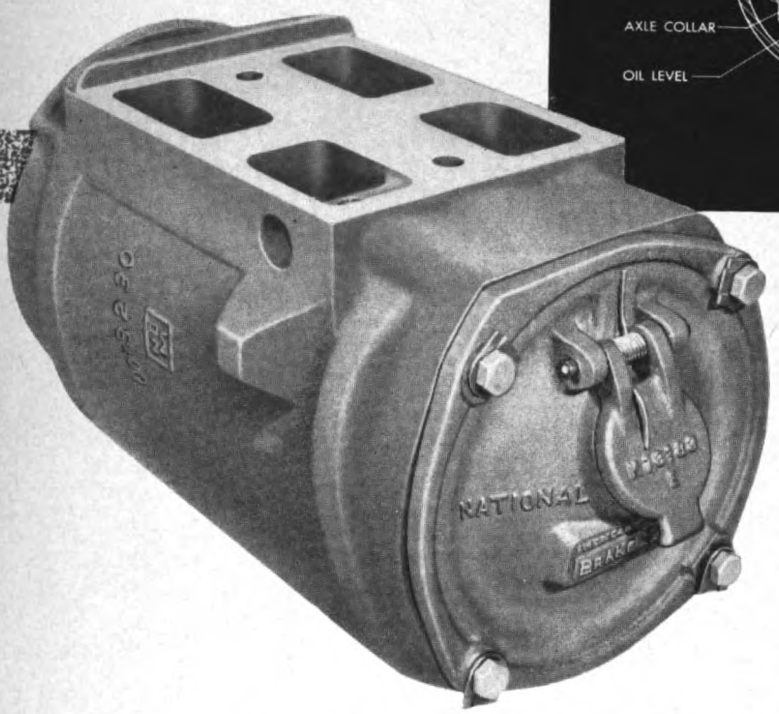
Progress Is Our Most Important Product

GENERAL ELECTRIC

The cartridge bearing encircles the journal. The journal collar is machined off to permit assembly, and a separate collar is secured with cap screws. The cartridge unit is cast of high strength bronze and plated with a heavy-duty lead-tin alloy. It contains its own lubricating system and is effectively sealed by a lubricated felt ring riding on the conventional dust guard diameter. The Redipak twin lubricating pad is installed when the cartridge is applied to the axle. Oil is contained in the cartridge, not in the box. The usual journal box lid is not needed.



CROSS SECTION OF CARTRIDGE SLEEVE BEARING ASSEMBLY



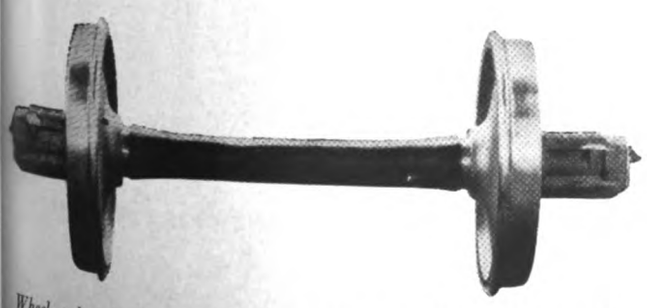
Here is the New National Cartridge Bearing!

Road service is now demonstrating that this economical sleeve bearing stands up under today's toughest freight car service

This revolutionary new concept in journal bearing design—now being road tested—may well become the freight car bearing of the future. The National Cartridge Bearing is a complete, sealed bearing and lubricating system. It neatly fits a standard journal box after the dust guard well has been cut out. The bearing encircles the journal—so it cannot lift or shift—and contains its own oil reservoir, Redipak® twin lubricating pad, cover and seal.

Here are a few of the principal advantages offered by the cartridge bearing unit: It stands up to greater impact and braking forces than do roller bearings. It requires very little maintenance—just an infrequent check of oil level and occasional replenishment of oil supply. It assures longer life—no measurable wear on either bearings or journals in over a year's accelerated road service. It minimizes the chances of hot boxes. And finally, it provides savings in initial costs when compared to roller bearings . . . savings in installation and replacement costs . . . and savings in removal costs when a wheel change is needed.

Present service tests on three roads have proven excellent and are validating our laboratory findings. One thousand car sets have been approved by AAR for test in interchange service.


Wheel, axle and cartridge sets are made up in advance for assembly into trucks. No bearing work is done on the rip track.

A-5242

AMERICAN Brake Shoe COMPANY

RAILROAD PRODUCTS DIVISION
530 Fifth Avenue • New York 36, N. Y.

How Armco Freight Car Flooring Helps Boost Profits

Nailable Armco Freight Car Flooring builds this four-way foundation for higher profits from gondolas, box or flat cars:

1. They last longer because they're stronger — Hat-shaped steel ribs and wood planks, laid alternately, bear up under heavy lading. At the same time, they reinforce the car underframe.

2. Less down-time—Strength to resist damage helps Armco floors keep cars out of the repair shops.

3. Costly claims reduced—since Armco Freight Car Floors stay in good condition, they help cut down on damage to lading.

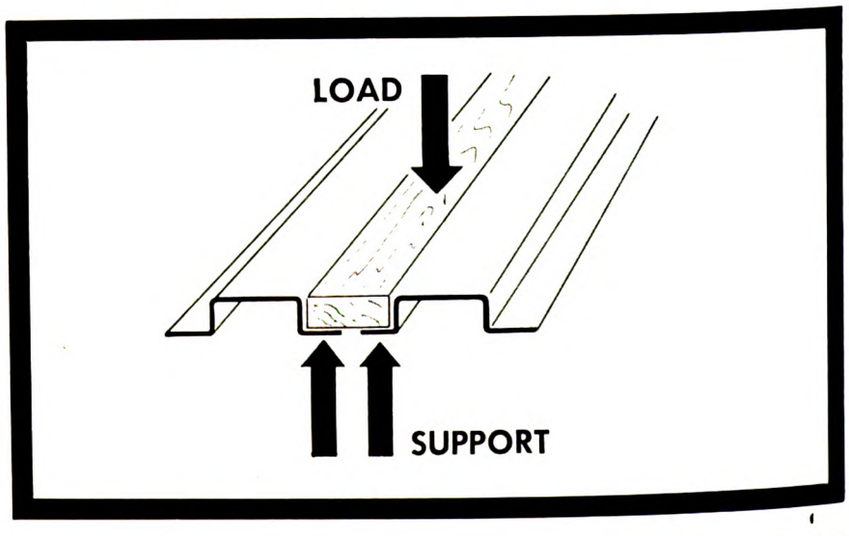
4. Each car produces more revenue—Armco floors support bulk *and* unit lading. You get more work from fewer cars because it is not necessary to choose cars by floor type.

Wheel loads of five tons from lift trucks are common, but easily supported by Armco Freight Car Floors. The reason: Two steel ribs support each wood plank.

Tailored Floors

After studying blueprints of your car frames, Armco engineers "tailor" standard Armco Flooring to suit your needs. For example, ribs will come coped to clear rivet heads if your car construction requires. Detailed drawings reach you before the flooring arrives — help speed assembly.

Further information on Armco Freight Car Flooring is readily available. Just contact the Armco Sales Office near you, or write us at the address below.



ARMCO STEEL CORPORATION

1387 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

If you want an Impact Wrench designed and built the way it should be in the first place and a factory that you know goes a little bit further than most in standing behind its tools...

BUY A... SIOUX

IMPACT WRENCH

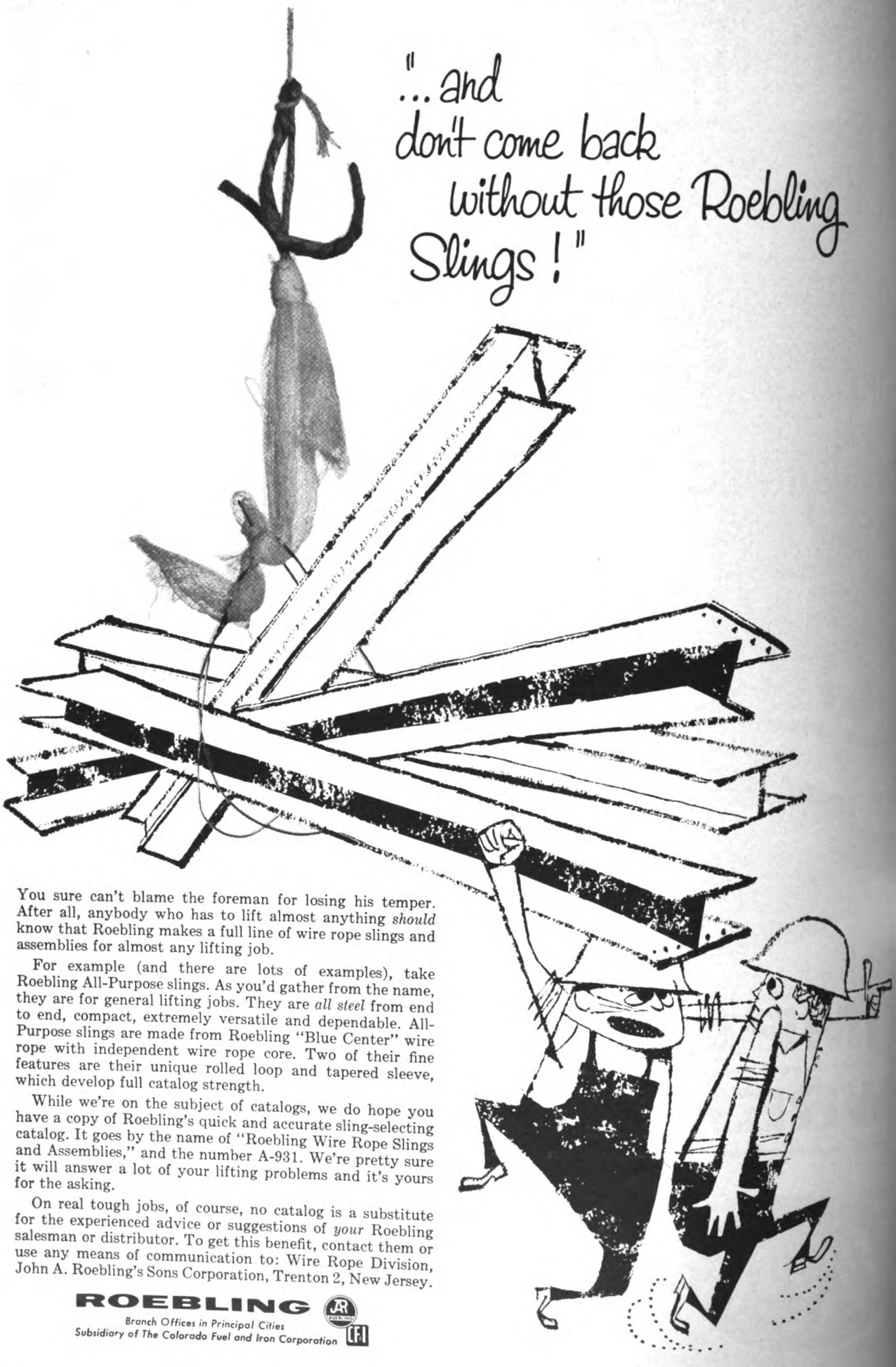
- ELECTRIC DRILLS
- SCREW DRIVERS
- SANDERS
- GRINDERS
- IMPACT WRENCHES
- POLISHERS
- PORTABLE SAWS
- FLEXIBLE SHAFTS
- ABRASIVE DISCS
- VALVE FACE GRINDING MACHINES

LOOK UNDER ELECTRIC TOOLS!

SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.



You sure can't blame the foreman for losing his temper. After all, anybody who has to lift almost anything *should* know that Roebling makes a full line of wire rope slings and assemblies for almost any lifting job.

For example (and there are lots of examples), take Roebling All-Purpose slings. As you'd gather from the name, they are for general lifting jobs. They are *all steel* from end to end, compact, extremely versatile and dependable. All-Purpose slings are made from Roebling "Blue Center" wire rope with independent wire rope core. Two of their fine features are their unique rolled loop and tapered sleeve, which develop full catalog strength.

While we're on the subject of catalogs, we do hope you have a copy of Roebling's quick and accurate sling-selecting catalog. It goes by the name of "Roebling Wire Rope Slings and Assemblies," and the number A-931. We're pretty sure it will answer a lot of your lifting problems and it's yours for the asking.

On real tough jobs, of course, no catalog is a substitute for the experienced advice or suggestions of *your* Roebling salesman or distributor. To get this benefit, contact them or use any means of communication to: Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

THE

M·F

UNI-TORQUE LOCK NUT

has something

more

than the standard holding features of ordinary lock nuts.

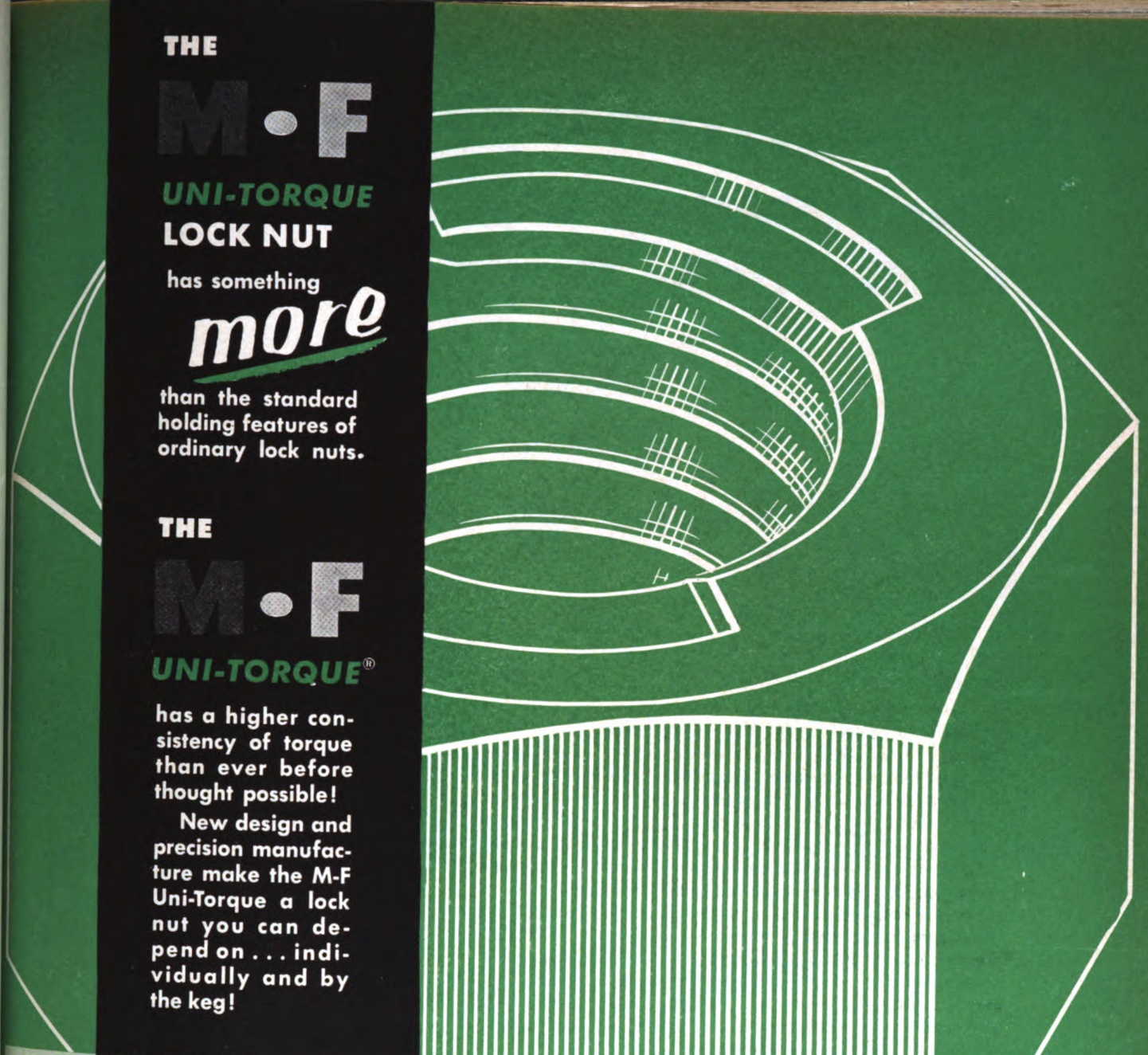
THE

M·F

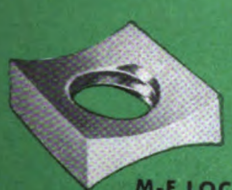
UNI-TORQUE®

has a higher consistency of torque than ever before thought possible!

New design and precision manufacture make the M-F Uni-Torque a lock nut you can depend on . . . individually and by the keg!



Because of its low cost for high efficiency, the M-F Uni-Torque is the ideal lock nut for air brake equipment, angle-cock holders and other appliances subject to high vibration.



M-F LOCK NUT
No. 1
Used with a standard nut. Spins on.

M-F LOCK NUT
No. 2
Spins on, locks itself and holds.

GEARED TO PROGRESS
RPI MEMBER

M F

MAC LEAN FOGG

Lock Nut Company

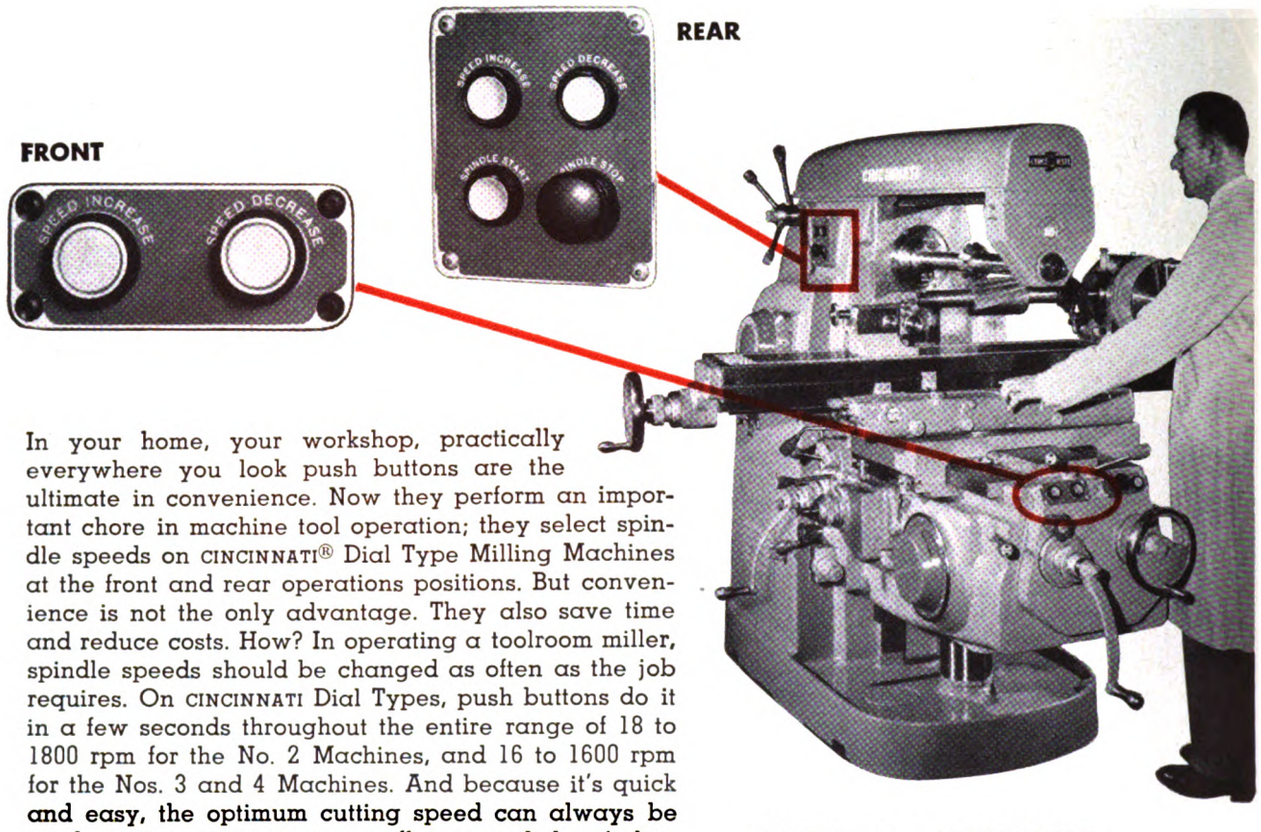
5535 NORTH WOLCOTT AVENUE,
CHICAGO 40, ILLINOIS

In Canada:
THE HOLDEN CO., LTD., MONTREAL

LOCK NUTS • WATERTIGHT BOLTS • SPECIAL BOLTS • FLOOR CLIPS • STANDARD NUTS • LADING STRAP ANCHORS •

Cincinnati Gives You

Push Button Convenience for Spindle Speed Selection



In your home, your workshop, practically everywhere you look push buttons are the ultimate in convenience. Now they perform an important chore in machine tool operation; they select spindle speeds on CINCINNATI® Dial Type Milling Machines at the front and rear operations positions. But convenience is not the only advantage. They also save time and reduce costs. How? In operating a toolroom miller, spindle speeds should be changed as often as the job requires. On CINCINNATI Dial Types, push buttons do it in a few seconds throughout the entire range of 18 to 1800 rpm for the No. 2 Machines, and 16 to 1600 rpm for the Nos. 3 and 4 Machines. And because it's quick and easy, the optimum cutting speed can always be used; cutting action is more efficient and there's less possibility of wrecking the cutter. There are many other CINCINNATI Dial Type advantages:

Power dual selection of feeds, 3/8" to 90" per min.
Independent, directional controls, with name knobs
Automatic backlash eliminator
Dynapoise chatter-damping overarm
Automatic table feed cycles available for plain and vertical machines

Want more information? Look in Sweet's Machine Tool File for brief specifications; complete data in catalog No. M-1915.

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CINCINNATI NO. 2 UNIVERSAL DIAL TYPE MILLING MACHINE easily takes a heavy helical milling cut.

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	Universal			no
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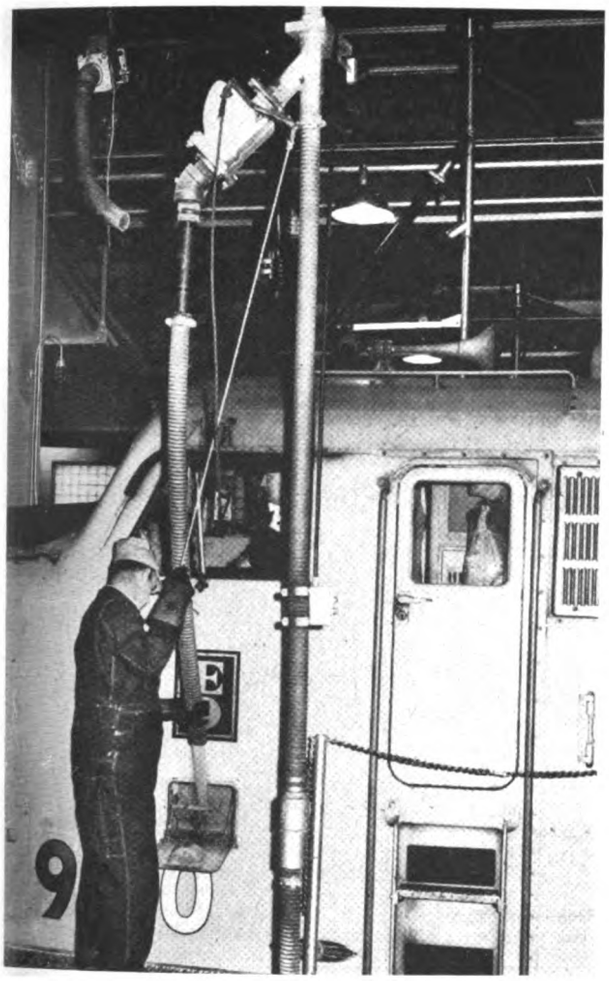
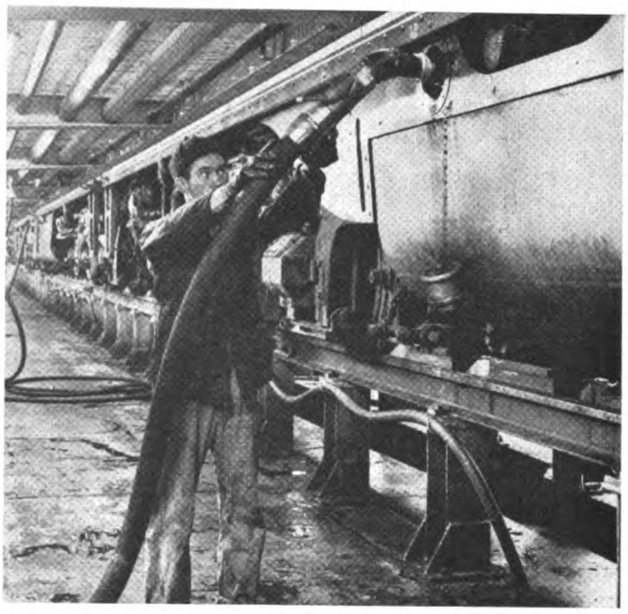




Fueling through the leak-proof and spill-proof nozzles is done from the lower shop level. Short sections of the elevated work platform overhead are hinged and fold back so fueling inlets higher on units can be reached.

Sanding of UP's road, road-switcher and switching locomotive can be done inside the shop where 28 outlets have hoses and controls which can reach sand boxes whether on the top, sides or ends of the units.

UP Fuels and Sands Diesels Indoors

New Council Bluffs "Lubritorium" aims at "one-stop" servicing for road locomotives.

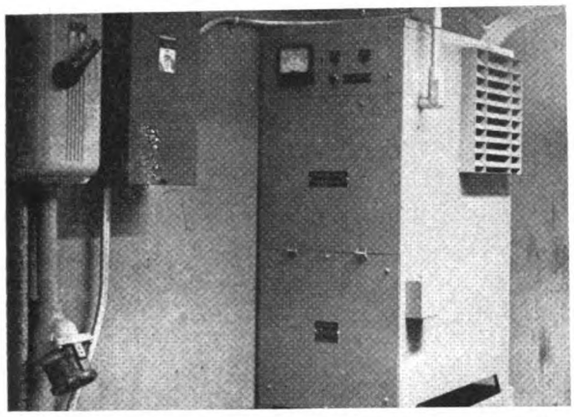
At Council Bluffs, Iowa, the Union Pacific has built a new facility in which all diesel-servicing operations—including fueling and sanding—are done inside. The UP labels this new shop a "lubritorium." It houses all the operations involved in servicing diesel locomotives, leaving nothing to be done out-of-doors except washing. Light repairs are made there, too, but heavy repairs, if required, are made in another shop at Omaha.

The fire-resistant structure, built at a cost of $2 million, is large enough to handle 24 units at one time. It is divided into two distinct sections, each having three through tracks. Four diesels can be handled simultaneously on each track. The facility has the conventional arrangement of depressed and elevated working platforms, and track pits. The two sections are separated by a concrete platform where there is a small machine shop, tool room and office.

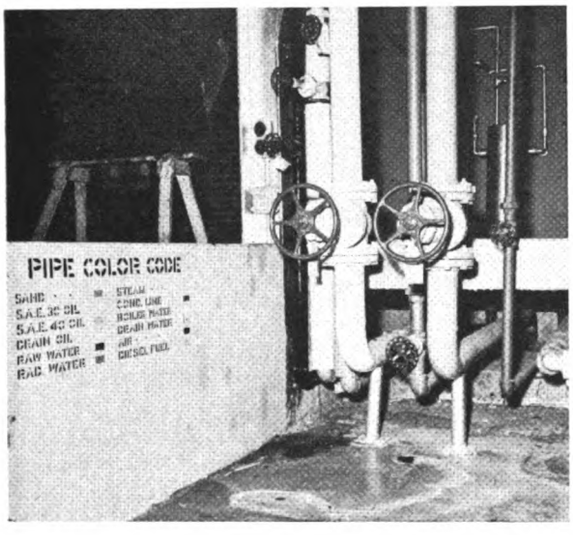
The building has a structural-steel frame, concrete-block exterior walls, and concrete floors. The elevated working platforms between tracks and along the side walls are formed of open-mesh steel grating.

Locomotives enter the shop through large rolling steel doors at both ends of the building. Once a diesel is run into this shop and stopped, it is possible that it may not be moved again until it is ready to couple onto a train destined for the Coast.

In addition to fueling, sanding and trip inspection, each unit passing through the shop is given the periodical inspection for which it may be due. As it rolls to a stop, samples of lubricating oil and cooling water are taken. A crew is assigned to conduct a thorough inspection, and repair defects found. While the initial inspection is given, tests are run on the oil and water samples. Each sample of oil is checked for dilution and viscosity. A blotter test is used to detect contamination and a hot plate check is made for possible water content. A borate-type inhibitor is used in UP engine cooling water. The concentration is checked and the inhibitor



Charge for diesel batteries without removing them from the units is done through the GE rectifiers in the shop.



Color scheme was established and all pipe lines in the shop are color coded to indicate the materials which they carry.

Each overhead hood has its own motor and exhaust fan. Elevated work platforms are open-mesh steel grating. All service lines except those for sand are carried under the elevated platforms.

replenished if necessary.

While the tests and inspections are being conducted, the air intake filters are removed when inspection shows the air flow restricted by accumulation of dirt. The dirty filters are given a thorough cleaning and treated with a new coating of oil in the filter cleaning and oiling machine.

A vapor degreasing machine, newly installed, with a chlorinated solvent type cleaner, is used for cleaning both diesel and gas-turbine fuel oil strainers. The cleaning fluid is heated electrically to 230 deg F, becoming a vapor which passes upward through the strainers resting on a platform above the liquid. As the vapor passes through the strainers, it carries with it the old oil and frees the foreign matter so it can be blown off with compressed air. Cooling coils above the strainers condense the vapors in the cleaning chamber and turn it back to liquid form.

An extra series of inspections has been added to those required by the ICC and the normal railroad servicing routine. In the case of passenger units, these periodical inspections are given every five days and to units in freight service every fifteen days.

An instruction book is available to the shop forces where the procedures to be followed are set out step by step. Code numbers on the inspection forms direct the workmen to the page that pertains to his particular inspection. "With this book," an official says, "any of our workmen can make the required examinations even though he is not familiar with the procedure for that particular inspection. All he has to do is follow the schedule set out in the book."

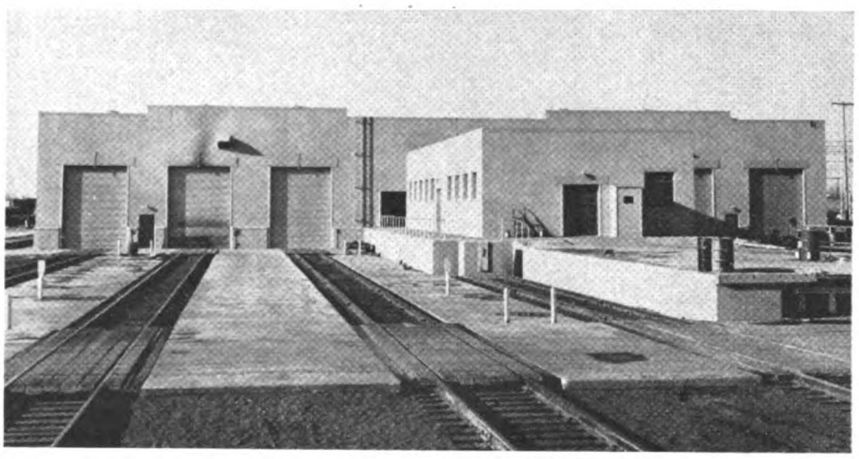
Daily work within the shop includes engine repairs such as replacement of pistons and liners, and there are often calls for major repair jobs. According to the shop foreman, equipment is available to do anything except pull the engine or main generator.

The fuel service lines are located immediately below the elevated platforms with outlets spaced at intervals so that any of the various types of diesel units may be fueled without moving them. All fueling nozzles are of the leak-proof, spill-proof type for reducing the fire hazard.

All other service lines, with the exception of those for sand, are also placed beneath the elevated platforms. These include zeolite-treated water for the steam generators, borate-treated water for the cooling systems, and lubricating oils. Sufficient outlets are provided to permit one-stop servicing. Hinged steel-mesh panels, provided where necessary along the edges of the platforms, swing upward to allow access to the water, fuel and oil inlets on the sides of the locomotive units, which otherwise would be inaccessible because of the platforms.

Service pipe lines had to be provided within the building for carrying these 12 different materials: Sand, S. A. E. 30 lube oil, S. A. E.

Oil testing area is at one end of the center platform which also has the machine shop, tool room and shop office.

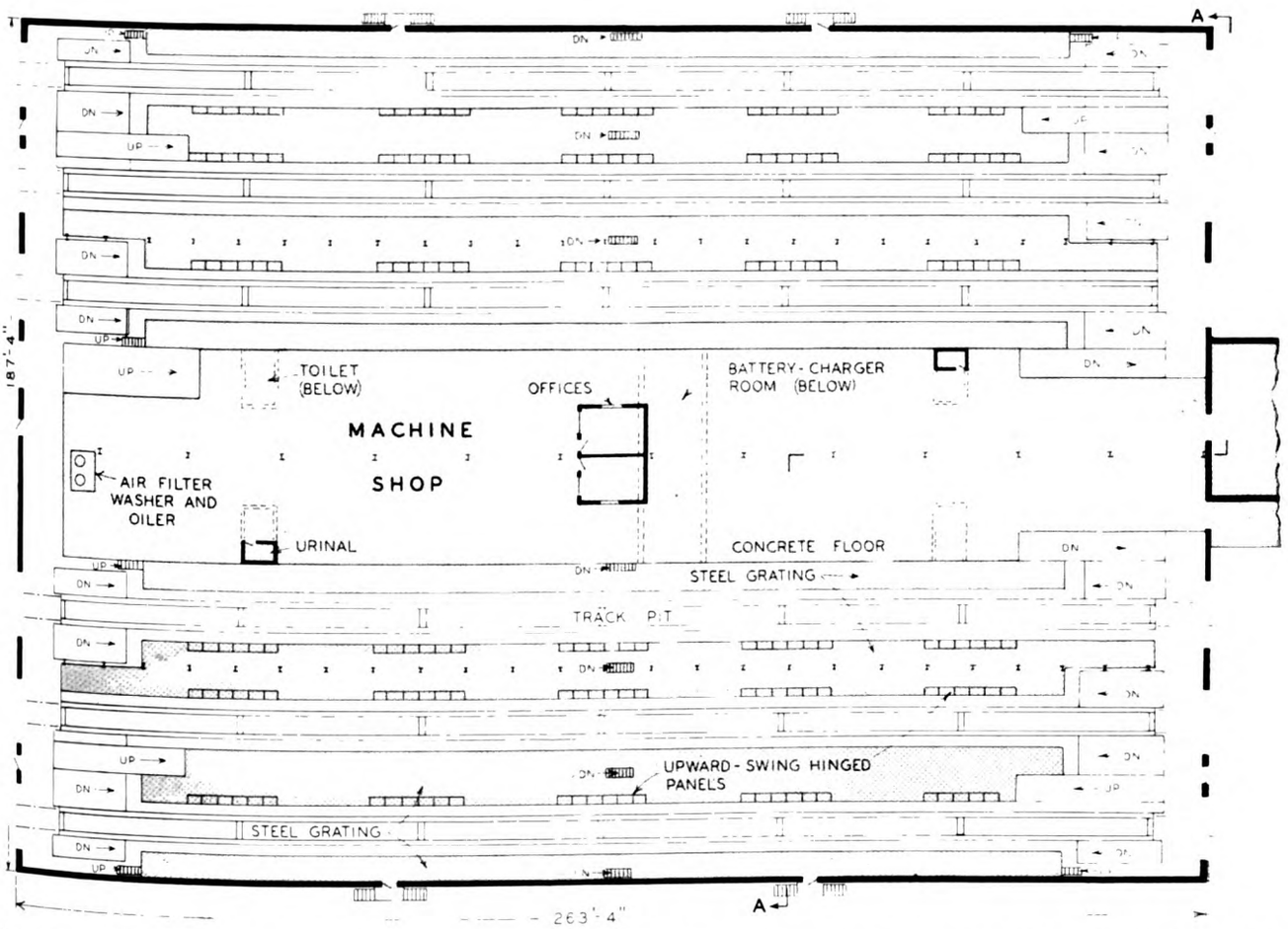


Stores building is at the end of the shop and has facilities for railroad and truck deliveries. Shop does not have the usual outside facilities for the fueling and sanding of the diesel locomotives.

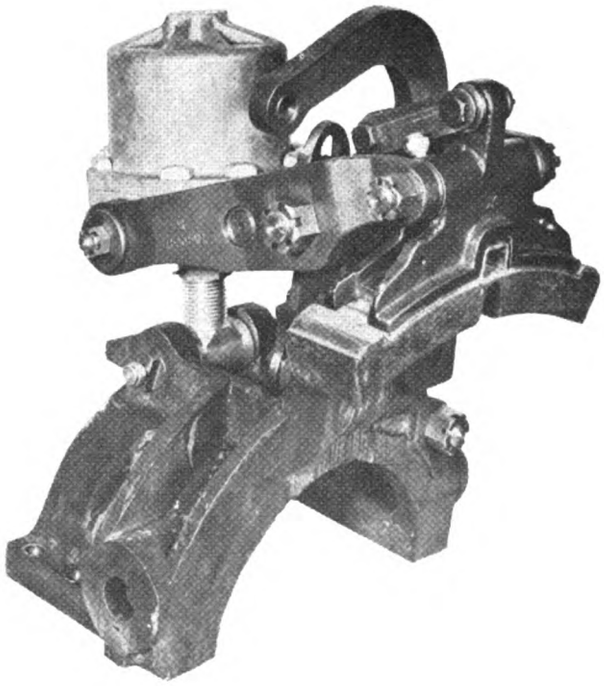
40 lube oil, drained lube oil, raw water, radiator water, steam, condensate, boiler water, drained water, air and fuel oil. A color paint scheme assures proper identification of the lines. The color scheme is stenciled on the walls at several locations for quick reference.

The provision of interior sanding facilities was one of the most difficult problems facing the designers of the building. A system was adopted that uses air pressure to force the sand through pipe lines to the service outlets. This installation includes two 10-ton capacity overhead storage tanks, one placed over the middle track in each section. There are 28 sanding outlets arranged so that sand may be delivered to the side, front or top boxes of locomotive units on any of the six tracks.

(*Continued on page 45*)



Minimum servicing time was the aim of this shop arrangement which has brought fueling and sanding operations inside. The shop holds four units on each track and can accommodate a total of 24 at one time. Ramps at the ends connect the three levels. Shaded areas designate those sections which are at carbody-floor height.

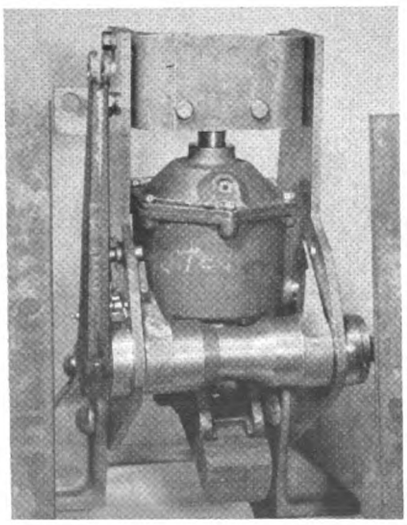


Westinghouse B-7 package brake unit is used on the New York Central "Xplorer" and New Haven "Dan'l Webster". Both of these trains are Pullman-Standard's "Train-X" design. The single shoe, mounted on the axle housing, acts vertically downward on the wheel tread. A single 7-in. cylinder moves levers designed for a 2.25 to 1 force ratio. Screw-type slack adjustment is made between the hollow rod and push rod.

Budd disc brake package, used on "Pioneer III" coach (***Railway Locomotive and Cars, March, 1957, p. 52***), is double acting. The entire brake unit is dismounted by removing two bolts. The single, cast-iron disc is "pinched" by composition linings on the two shoes. The outboard-mounted disc on each wheel is attached with bolts through the wheel web. Air cylinder, tongs, and tong supports are attached to the side frame.

For Lightweight Cars....Package Brake Units

Lightweights have created the need for different braking systems. Compact package brake units are used with the recently-developed control equipments.



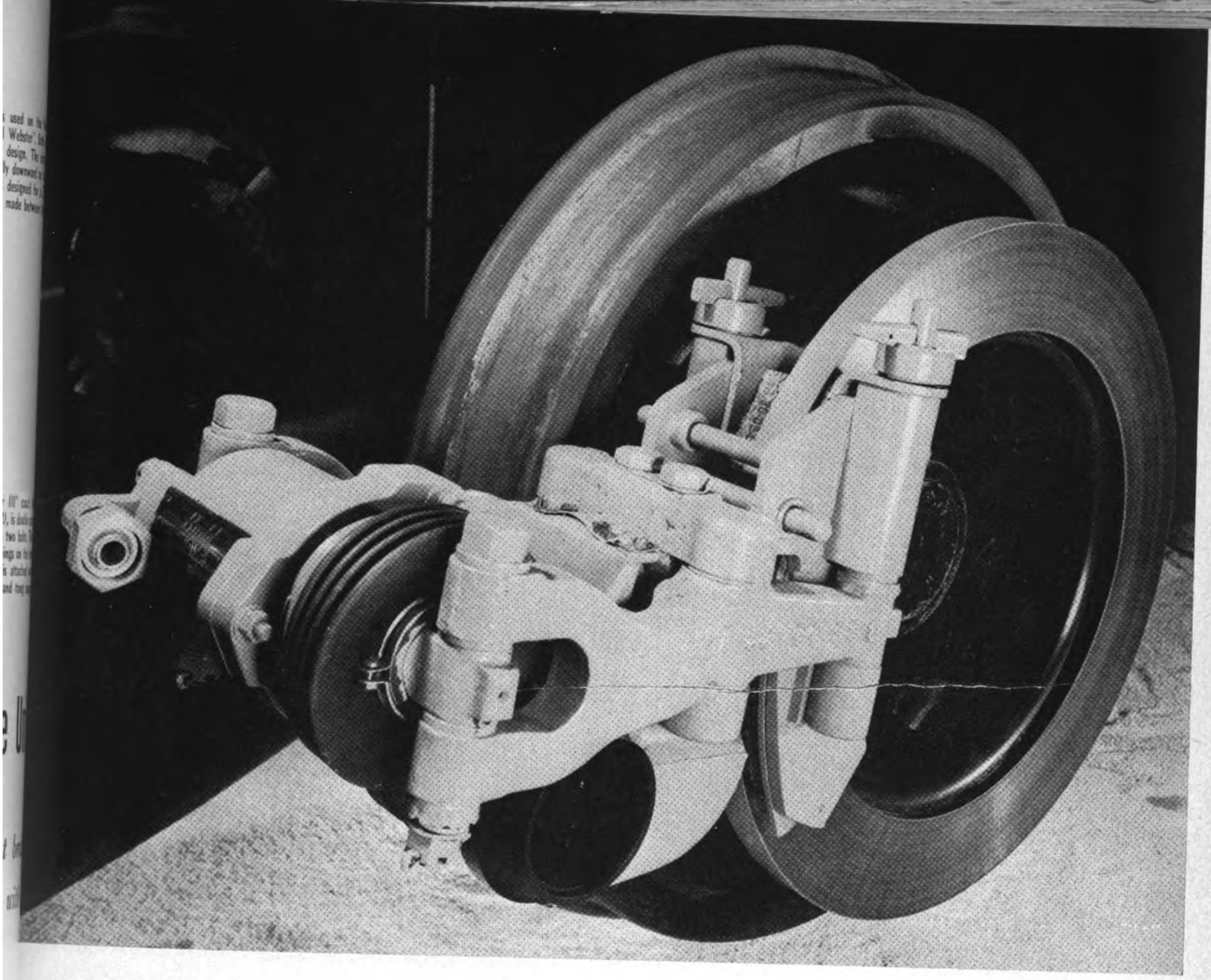
Brake package for ACF-built Talgo-type cars of New Haven's "John Quincy Adams" and for a Boston & Maine train yet to be delivered has direct connection between brake cylinder and brake head. Westinghouse designed this arrangement.

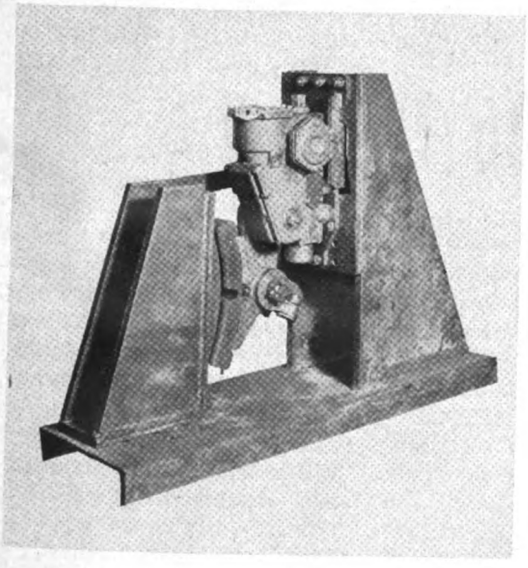
Serious consideration of lightweight trains began more than twenty years ago. Early efforts produced the first Burlington and the Union Pacific "streamliners." Through the years, two objectives have been lower operating costs and faster operating schedules.

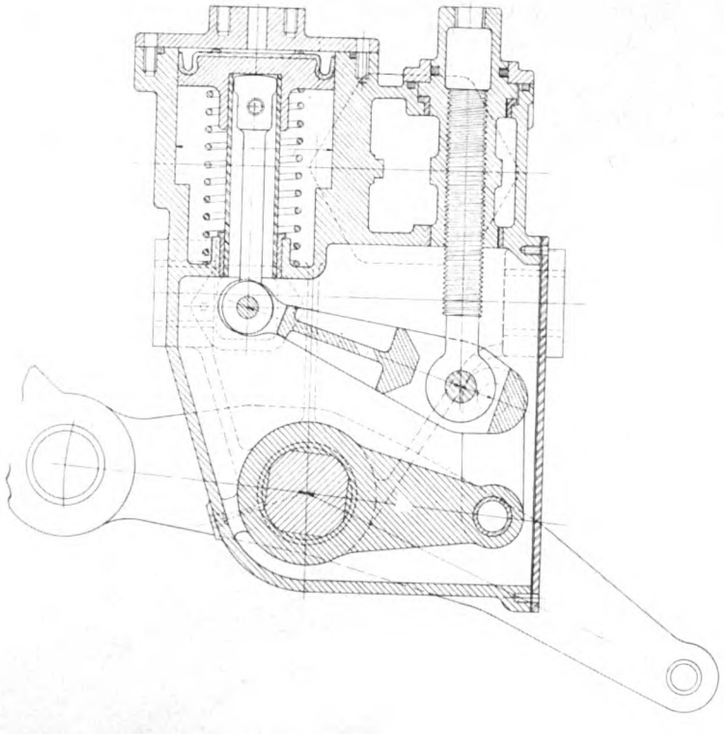
Although light weight, high strength materials led the way, recent passenger equipment designs have utilized air-ride suspension, single-axle support, and newly-designed locomotive and car brake equipment. The Westinghouse "26" and New York "LWE" equipments were designed to reduce weight while incorporating all the accepted safety features (*Railway Locomotives and Cars,* October 1956, p. 67 and December 1956, p. 44). Accessibility of the various components in restricted spaces is a result of their compactness. The introduction of composition brake shoes has permitted the use of smaller cylinders and reservoirs.

Along with the control equipment, compact package brake units have come into their own and are in service on a number of light-weight trains. These units include the brake cylinder, a means for adjusting slack, and the required foundation parts. Higher operating efficiency over conventional arrangements of brake rigging has been reported. For one thing, friction loss is reduced because fewer levers and pins are required.

Package brake units mean just that. Individual brake mechanisms function with each brake shoe. This insures a positive and uniform release clearance between the shoes and the wheels. Because the units are removable and replaceable, servicing can be simplified.







Package unit designed by Westinghouse for Boston MTA subway cars has a 4½-in. brake cylinder, an automatic pneumatic slack adjuster, and sufficient leverage for a 5 to 1 force multiplication. A single housing completely encloses the assembly (right).

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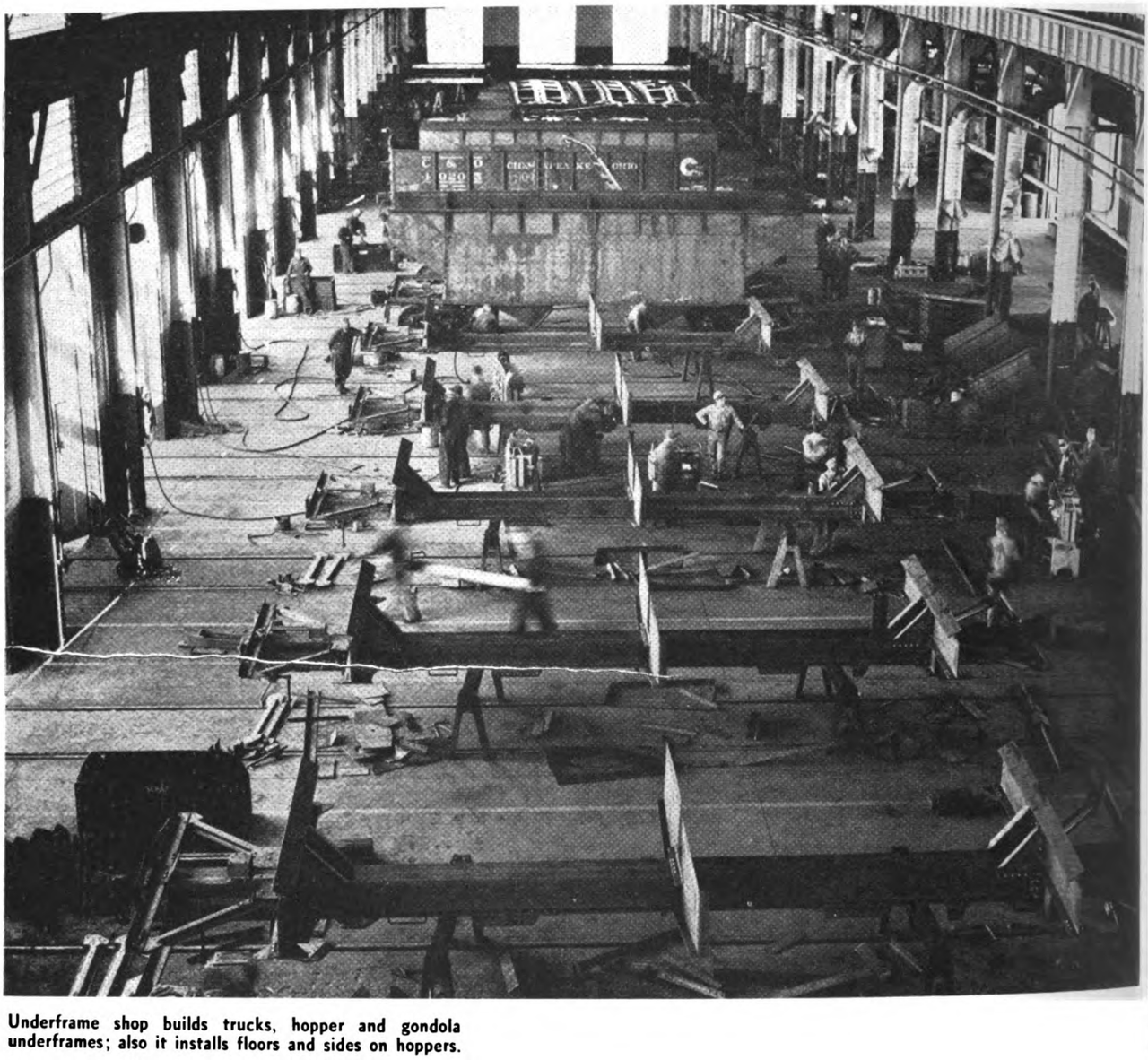


Underframe shop builds trucks, hopper and gondola underframes; also it installs floors and sides on hoppers.

B&O Makes Its Decision . . .

'Patching' Repairs Don't Do The Job

Heavy repairs, complete rebuilding, or replacement with new cars are the most economical methods for putting a freight car fleet in condition to operate economically and to provide shippers with cars to handle their traffic, according to the Baltimore & Ohio. Its freight car designs, freight car repair facilities and repair forces are being realigned in accord with these concepts. Already the B&O's bad order ratio is reflecting the success of this program. The 25 new freight cars turned out each working day by the Baltimore & Ohio's DuBois, Pa., car shop are part of an important phase of this long-range plan to make the B&O car fleet better able to handle the road's present and future traffic. The B&O's long-range program will put cars in such condition that they will not require shopping for 15 to 20 years. The program is planned to reduce the bad order ratio to 3 per cent or less by 1960.

Premises in this plan are the following:

(1) Older cars will be replaced with new purchased cars, or they will be rebuilt with new material and parts reusing only those components which are relatively modern.

(2) Each type of car will be standardized into relatively few classes. This will reduce material stocks and will permit the streamlining of heavy and reconditioning repair operations.

(3) The railroad's facilities can turn out freight cars which measure up to the highest standards; the latest car construction techniques can be utilized while making the maximum

use of B&O's skilled manpower.

(4) Saving realized from this program can maintain a thorough and continuing repair program which will increase the number of serviceable cars.

On March 11, 1955, the B&O had 15,160 bad-order cars of 16.8 per cent of its ownership. On January 11, 1957, this had been cut to 3,282 bad-order cars—3.5 per cent. In less than two years the railroad had increased its supply of serviceable cars by 11,816.

"Heart" of Operation

The DuBois assembly lines for freight car building are only one phase of the B&O's new freight car program. However, the B&O classifies DuBois car shop as the "heart" of the overall scheme which aims to increase the road's supply of serviceable equipment through systematic car building and rebuilding. This process is intended to make necessary only the lightest of repairs on these rebuilt cars during the coming years. DuBois shop was converted from an abandoned steam locomotive back shop and was described in *Railway Locomotives and Cars, June, 1955, P 62.*

The DuBois shop was established to do production-line repair work prior to the adoption of the new car program. Since October, 1956, it has been engaged solely in the rebuilding program. By using all of the facilities to near maximum, output has been shoved up to 25 essentially new cars each working day.

The output of 25 cars each day from the present plant is dependent upon the purchase of complete subassemblies from car builders. The road is concentrating almost all of its efforts on hoppers, box cars and gondolas which collectively add up to more than 90 per cent of the B&O ownership. In the program, cars are cut down completely and only such parts as side frames, bolsters, brake cylinders, reservoirs, retaining valves, wheels and axles are reused. Even these are closely inspected, and only the newest ones and the latest models are returned to service.

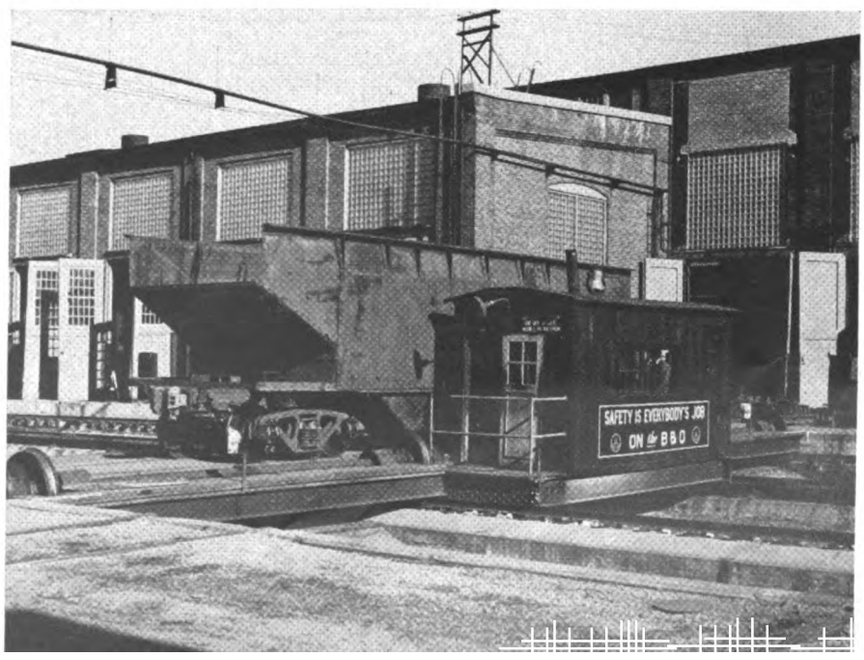
The assembly operations take place in four buildings—three originally used for locomotive repairs,

(Continued on page 43)

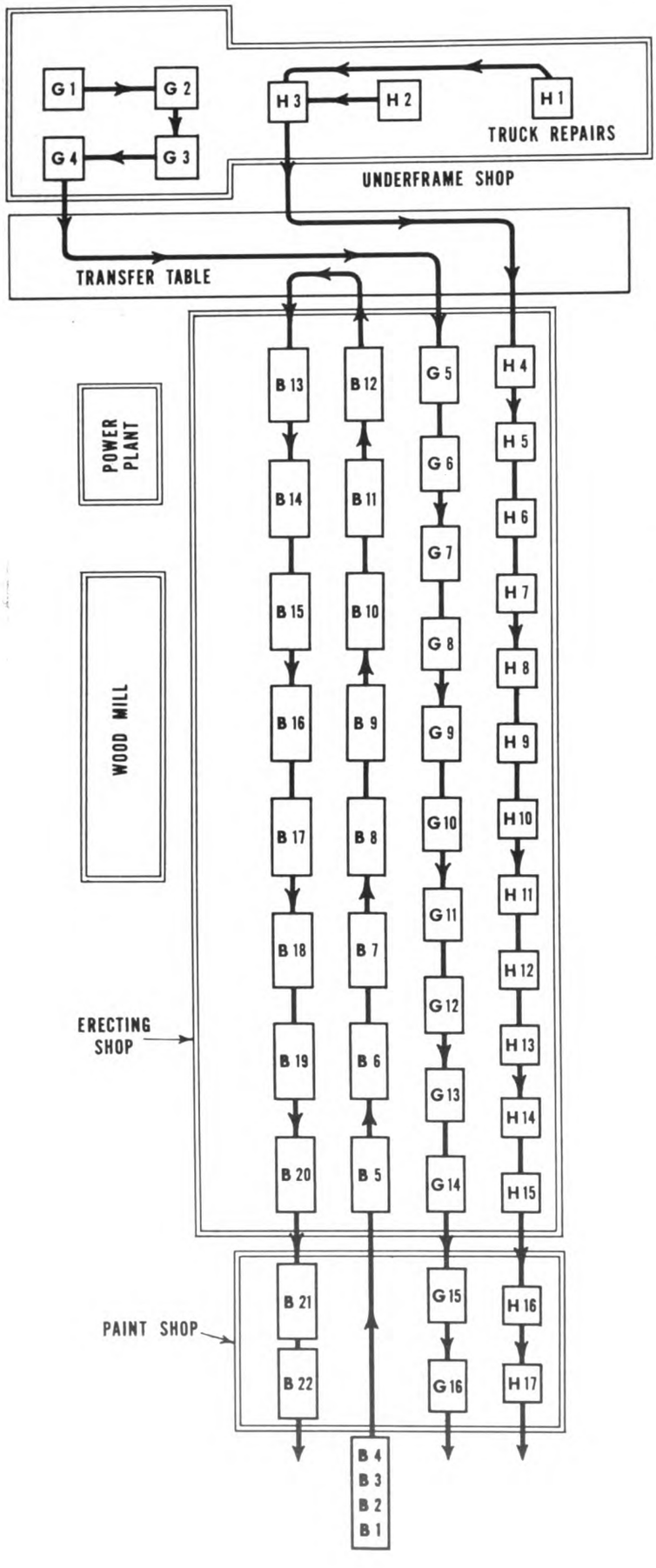
New from ground up is B&O theory on freight car rebuilding. First step is systematic cut-down. Only few parts are salvaged and reused in program.

Truck rebuilding is systematic. Shop has two tread lathes and one journal lathe. Tramrails cover entire truck repair area to simplify procedures.

Transfer table moves hopper to erecting shop where it will start down 12-station production line. Box car production line is reversed on table.



These Lines Produce 25 Cars Daily . . .



Box Car Assembly

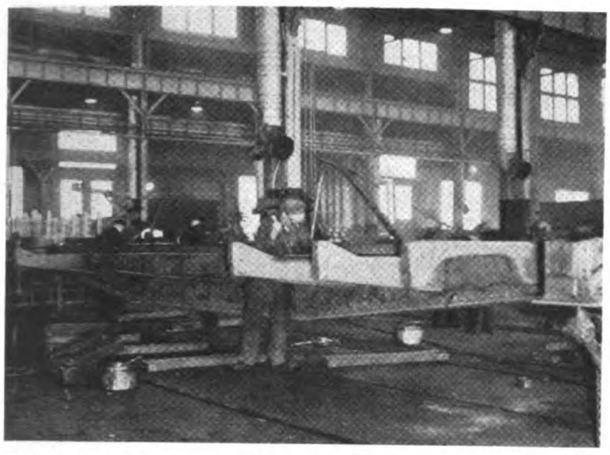
- B1 Assemble roof panels and caps, and rivet.
- B2 Assemble trucks complete with levers, rods, seals and lubricators.
- B3 Apply underframe to trucks and install couplers.
- B4 Apply sides and ends to underframe with fitting-up bolts.
- B5 Apply draft gears, lever brackets, drive bottom of car.
- B6 Apply foundation brake.
- B7 Apply rods and levers.
- B8 Rivet sides and ends to underframe.
- B9 Apply nailable steel flooring.
- B10 Apply wood flooring.
- B11 Drill floor and apply floor clips.
- B12 Weld studs for furring strips and posts.
- B13 Rivet top of car.
- B14 Apply and fit up roof assembled at B1.
- B15 Rivet roof.
- B16 Apply posts and furring strips.
- B17 Apply side lining and lading anchors. Nail lining.
- B18 Apply end lining. Nail lining.
- B19 Single car tests, cement steel flooring, nail lining.
- B20 Inspect and final work.
- B21 Spray Painting.
- B22 Stencilling.

Gondola Assembly

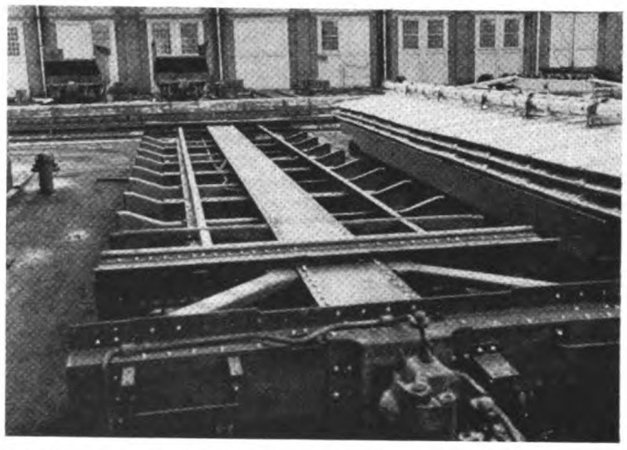
- G1 Assemble center sill.
- G2 Assemble underframe including bolsters, diaphragms, end sills, couplers, draft gears. Rivet.
- G3 Assemble trucks complete with levers, rods, seals and lubricators.
- G4 Apply underframe to trucks.
- G5 Apply sides to underframe with fitting-up bolts.
- G6 Apply steel portion of composite floor.
- G7 Fit and ream corners.
- G8 Apply ends and top end angles.
- G9 Ream ends, floor and sides.
- G10 Rivet.
- G11 Apply wood floor, hand brake and safety appliances.
- G12 Drill wood floor.
- G13 Apply floor clips and lading strap anchors. Make brake test.
- G14 Inspect and final work.
- G15 Spray painting.
- G16 Stencilling.

Hopper Car Assembly

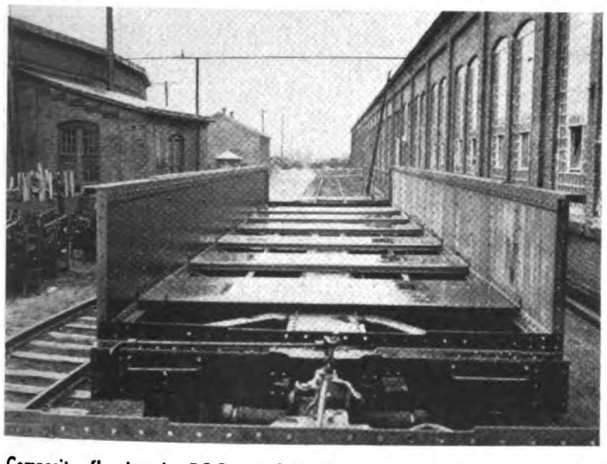
- H1 Assemble trucks, complete with levers, rods, seals and lubricators.
- H2 Assemble underframe including couplers, draft gears, bolsters, cross ridges, center plates, end sills and diagonal braces.
- H3 Place underframe on trucks and apply hoppers, longitudinal hoods, floors and sides with fitting-up bolts.
- H4 Apply ends and side braces with fitting-up bolts.
- H5 Tack weld sub-assemblies so fitting-up bolts can be removed. Ream.
- H6 Ream.
- H7 Rivet center sill area of car.
- H8 Rivet top, sides and floor (A end). Rivet sides.
- H9 Rivet top, sides and floor (B end). Rivet sides.
- H10 Complete inside riveting.
- H11 Apply AB valve, cylinder and reservoir.
- H12 Apply levers, rods and service pipe.
- H13 Apply train line, complete seal welding and the hand brake application.
- H14 Hang doors, complete brakes, make brake test.
- H15 Final inspection and work.
- H16 Spray painting.
- H17 Stencilling.



Underframe assembly for gondolas has until recently been done at DuBois. This was three-step operation which used fabricated parts.



Latest cars use purchased underframes. Adjacent track has assembled box car roofs ready to be moved into the erecting shop.



Composite flooring in B&O gondolas is composed of alternate sections of wood decking and steel plates formed into shallow channels.

Finished gondolas have tie downs on side angles. Box cars have special steel flooring through doorway area and wood in car ends.

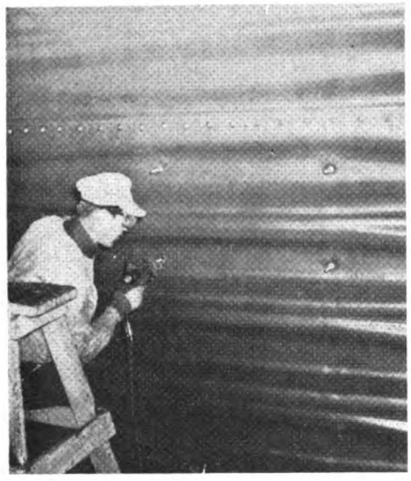
(Continued from page 41)

and the fourth an open-sided paint shop which was built as part of the conversion. In addition, there are stores facilities, a wood mill, and an outdoor area where cars are cut down. Actually the entire operation involves a number of B&O shops. Air brake portions are processed through the system brake shop at Cumberland, Md., new wheels and axles come ready for application from the wheel shop at Glenwood (Pittsburgh, Pa.), truck side frames are annealed at Keyser, W. Va., and fabricated car parts come from B&O's bolt and forge shop at Cumberland. In addition, this high-output operation involves the plants of the major car builders. These builders are supplying or have supplied

(Continued on page 44)

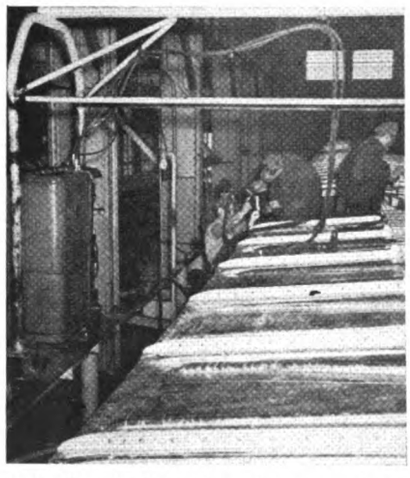
Typical of work simplification at DuBois was development of dolly which handles and locates hopper doors so the hinge pins can be slipped into place easily. Hopper doors complete with hardware are assembled prior to application as are most parts of all the cars.

B&O Tools For High Output . . .



Stud welding has speeded application of posts and nailing strips in the box cars being built at DuBois. Earlier the shop used the stud welders to apply studs to underframe members for attaching decking on flat cars which the B&O assembled.

Five-electrode rivet heater along box car production line is one of 24 electric-resistance rivet heaters used throughout DuBois shop. The ability to handle various sizes of rivets while heating only those to be used immediately—along with absence of fumes and spilled oil, reduction in compressed-air consumption by the shop, and lower operating costs—have led to increasing ownership from the original three heaters. Triple- and single-electrode machines are used at other places in the shop where demand is lower.



Hydraulic cold riveter is used to assemble the diagonal-panel roofs and apply the run board brackets. This subassembly is then moved to the erecting shop where a second hydraulic riveter is used to attach the roofs to the top plates and ends of the box cars. At both locations the riveters have been located on traveling bridges and can readily be moved the car length which must be covered to accomplish the jobs.

Automatic nail driving with air hammers is recent innovation in the production line. B&O uses Screwnails in the application of box car lining, and more than 3,000 nails per car has made mechanization of this operation an important goal.

(Continued from page 43)

major subassemblies such as center sills, complete underframes and complete sides.

The underframe shop was formerly the boiler shop. It now houses wheel and journal lathes, a truck assembly area, blacksmith shop, pipe shop, and—in its main bay—the assembly area for hopper and gondola underframes. The four-track erecting shop has one track for the hopper car production line, one for gondolas, and two tracks for the assembly of box cars. Both of these buildings are heated during cold weather. The four tracks in the erecting shop continue on out through the paint shop.

Box cars are partially assembled outside. Underframes are placed on trucks, and sides and ends are hung on the underframes by an outside overhead crane and by locomotive cranes. These cars then move through the paint shop, and the first half of their indoor production line in the erecting shop runs counter to the general flow. The last half of this line does move in the same direction as those for the other two types of cars. All of the assembly operations are detailed on an accompanying diagram.

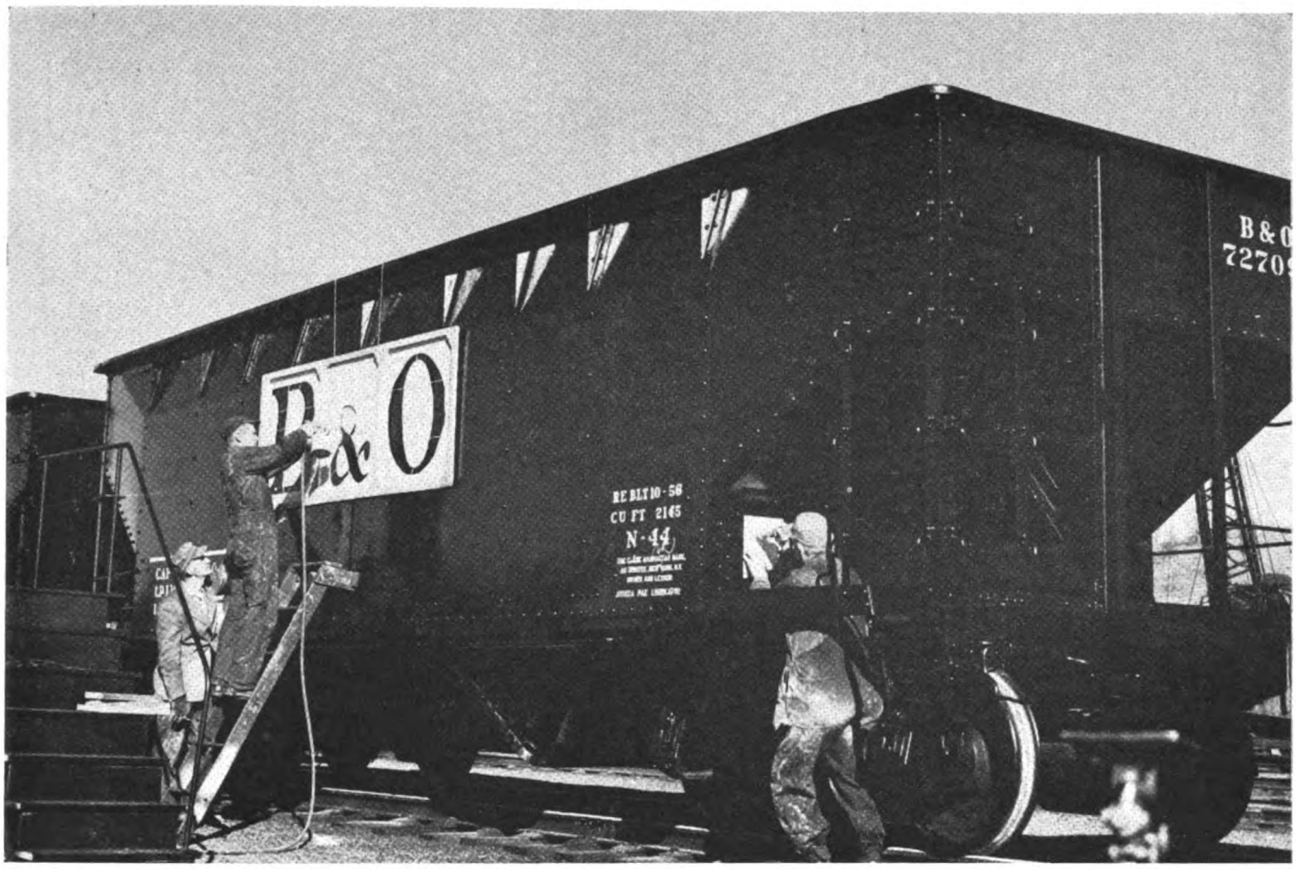
Currently nearly 700 men are engaged in these operations. This is principally a one-shift operation. Some equipment bottle-necks—such as the need for additional overhead crane capacity—have necessitated some second shift work. Since the shop was opened, an additional tread lathe, another air compressor and one more overhead crane have been installed to permit greater output.

More Production

The B&O has pursued a policy of equipping DuBois with rectifier welders from the time it was changed from a locomotive shop. This type of welding machine is now used exclusively. At the time of the conversion, DuBois got three resistance-type electric rivet heaters. These have proved so successful that the shop now has 24 of these units and plans are underway to convert it completely to this type of rivet heating. Hydraulic cold riveters are used in the assembly and application of box car roofs. Considerable work has been done with hot paint spray and direct-to-metal paint.

Building size and the large number of cars being assembled crowds and complicates materials handling, but this has not interferred with shop output. Some large subassemblies such as sides and roofs must be moved to the assembly positions each night. Attempts are made to place enough of all the smaller parts at the assembly stations to operate the production lines without restocking during the 5-day work week.

Stores department stocks are maintained around all the shop buildings. Movement of this material



Stencilled after spray painting, Class N44 hopper is nearly ready for the road. Standardized model is replacing several earlier designs now undergoing rebuilding. DuBois shop has recently been turning out ten of these hopper cars, ten box cars and five gondolas each working day.

and other shop operations are conducted with the following materials handling equipment: two tractors, nine flat-top trucks, one platform lift truck, one boom and platform lift truck, four crane trucks, two 25-ton locomotive cranes and four 15-ton locomotive cranes.

All of the cars are being built with carbon steel. New car trucks are all equipped with ride control and older trucks being reused are fitted with snubbers. All cars get journal lubricators and dust-guard seals. Box cars are all equipped with lading anchors and steel flooring in the doorways. Gondolas get a B&O-designed composite wood and steel floor. Hopper cars originally built with outside stakes are being rebuilt with inside-stake side construction of the AAR design.

DuBois car shop, with its complete rebuilding operation in high gear, is not making an appreciable change in the total number of cars the B&O owns, but it is rapidly increasing the number of them ready and able to handle today's (and tomorrow's) traffic.

UP Sands, Fuels Diesels Indoors

(*Continued from page 37*)

There are 66 exhaust hoods placed over the tracks to remove gasses generated while test-running engines. Each hood has its own motor and fan for exhausting the diesel fumes through the roof.

The center machine-shop platform consists of a concrete floor on an earth fill. Four small toilet rooms have been provided beneath this platform, and also a battery-charging room which is reached from the depressed-floor level of either section.

Quick Charge for Batteries

Provision also has been made for giving a quick charge to batteries without removing them from the diesel units. This is done by means of G-E rectifiers permanently fixed to the columns which support the elevated platforms. These are placed at 14 locations so as to reach all units, and they have clip-on leads so that they will be detached without damage if the diesel should be moved. In general, the quick charge can be made in an hour, but the rectifiers are equipped with cut-out devices which stop the charging after eight hours.

Stores Facilities

Ramps are provided at the ends of the platforms to give fork-lift trucks access to each level from an adjoining stores building which houses the necessary supplies. The stores building, 35 by 100 ft. is placed on an outside concrete platform which has two car spots on one side and a truck tailboard at one end. Two locker buildings, one for enginemen and the other for the shopmen, were also constructed nearby.

Twenty miles of these Southern, steel-lined PS-1's have been built.

Southern PS-1 Box Cars Have Steel Lining

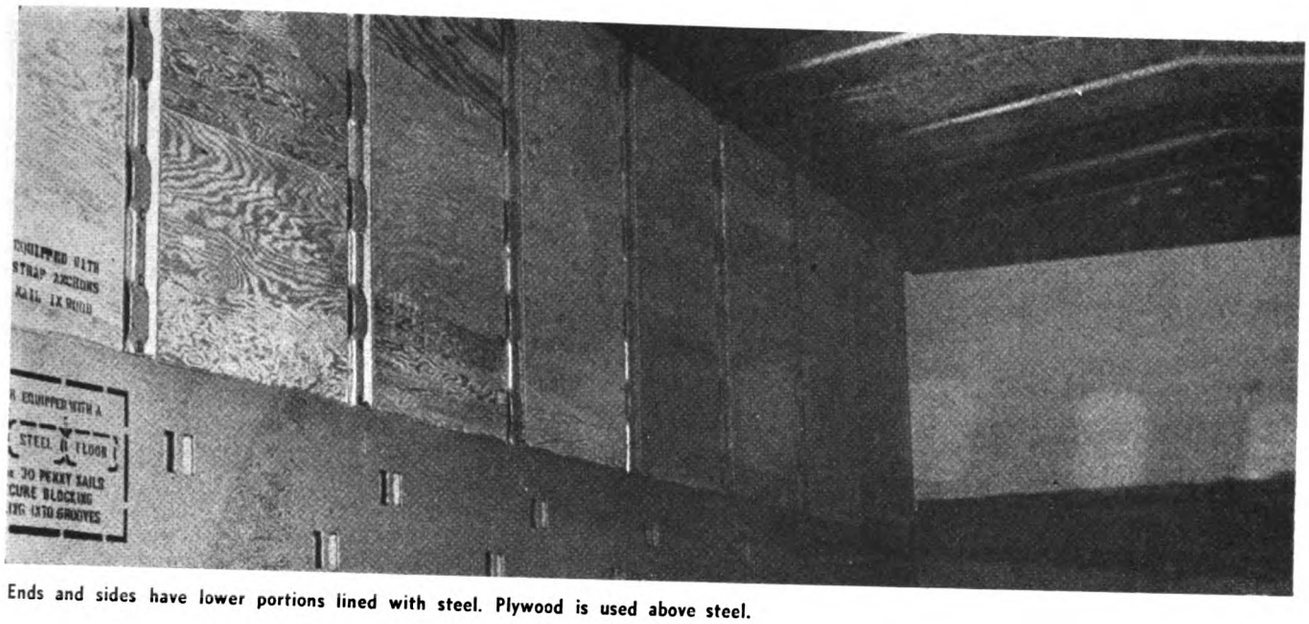
The two thousand PS-1, 50-ton box cars built for the Southern Railway at Pullman-Standard's plant in Bessemer, Ala., point up the flexibility of Pullman's standard design. Several features in these cars make them different from the standard PS-1. The length is 50-ft 6-in. instead of 40-ft 6-in. The door openings are 9 ft wide, the same as specified by the Southern for its 40-ft 6-in. cars built in November 1951.

The cars are steel lined to a height of 6 ft. The $\frac{3}{16}$-in. lining is applied in sections, each section being welded to the side posts, with the welds ground down to make a smooth surface for the application of a neoprene coating. After the lining is cleaned of rust, one light roller coat of neoprene primer is applied, and dried overnight. Then, five coats of liquid neoprene are applied with a paint roller—one light coat and four successive coats, each as heavy as possible. This is done as a precaution against condensation, rust and lading damage. Twenty gallons of liquid neoprene are used in each car.

Each quarter section of the steel lining (from the door opening to the end of the car) contains 55 slots for lading protection strapping. Above the lining are plywood sections, divided by P-S lading strap anchors —30 to each car. Each lading strap anchor, containing 5 slots, is

Sections of P-S nailable steel floor are easily installed.

Nailing posts for lading strap anchors lined up for application.



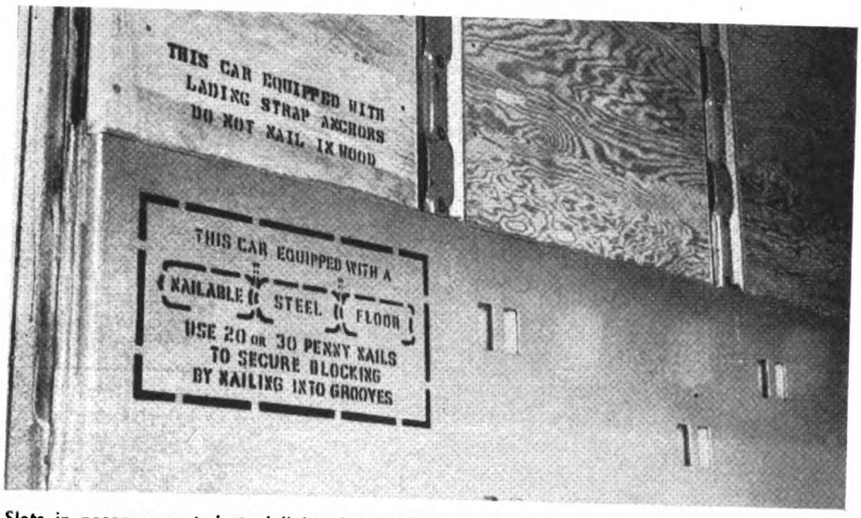
Ends and sides have lower portions lined with steel. Plywood is used above steel.

mounted on a nailer post, which is bolted top and bottom to the side posts. The cars are equipped with the P-S nailable steel floor, an optional type specified by the Southern.

Conventional P-S construction was used elsewhere throughout the car, including the precision welded underframe, the two-piece welded and corrugated end, riveted roof, and one-piece car sides. All the cars were given a water test during construction, and the stencilling was applied just prior to shipment.

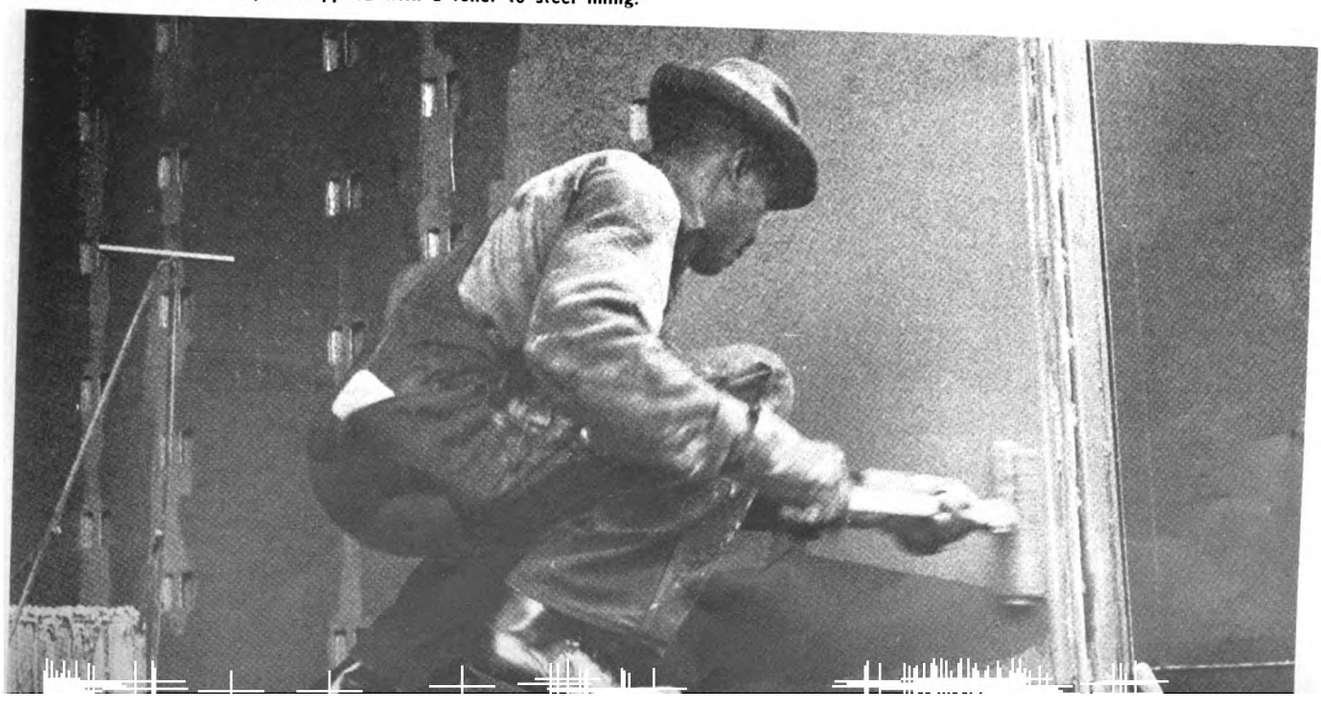
The light weight of the car is 60,700 lb.

Pullman-Standard has recently received an additional order for 200 of these cars, to be equipped with cushion underframes.



Slots in neoprene-coated steel lining form lading strap anchors.

One of five coats of neoprene applied with a roller to steel lining.

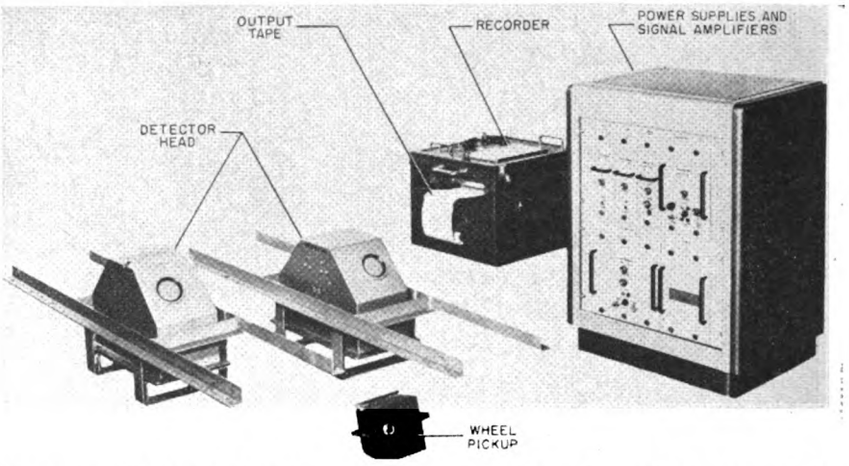


Here's an Electronic Hot Box Detector

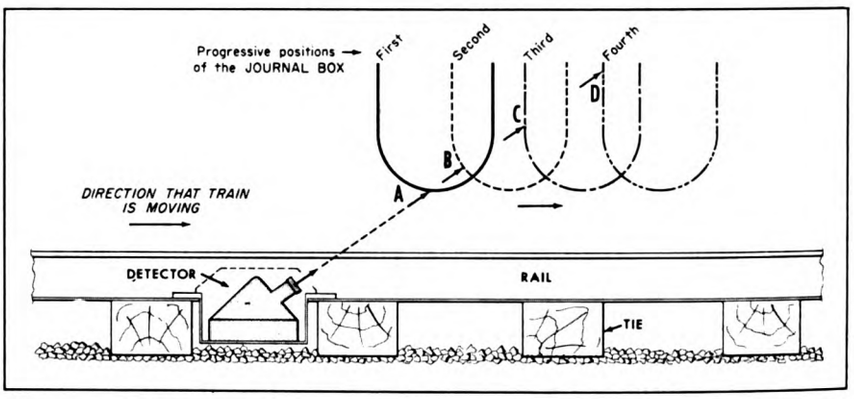
The Chesapeake & Ohio and Reading are operating hot box detectors designed by the Servo Corporation of America. Much early development work was done on the Norfolk & Western and the Pennsylvania. Already the device has located one C&O hot box which the road says could have caused a derailment. During early experiments on another road, the device located an overheated journal fitted with a lubricating pad. Sometimes these journal lubricators do not give the external indications associated with overheated waste packing.

The top of the journal box has the most direct metallic contact with the journal bearing and this area gives the best indication of journal temperature. Experiments indicated that the temperature of this portion of the box could be measured by means of its infra-red radiation at distances up to 5 ft. Servo devised the arrangement of "sighting" upward at an angle of about 40-deg in the direction of the train's travel. The detector is located about 16-in. outside the gauge line of the rail. It has a meniscus lens which "views" a very narrow band up the journal box as it recedes away from the detector. This narrow sight path does much to eliminate erroneous indications from other heat sources such as hot brake shoes, hot wheel rims and steam traps. In addition, there are two wheel-actuated electro-magnetic transducers which keep the detector circuits energized only while the wheel is passing between them. It is during this period that the detector "views" the box.

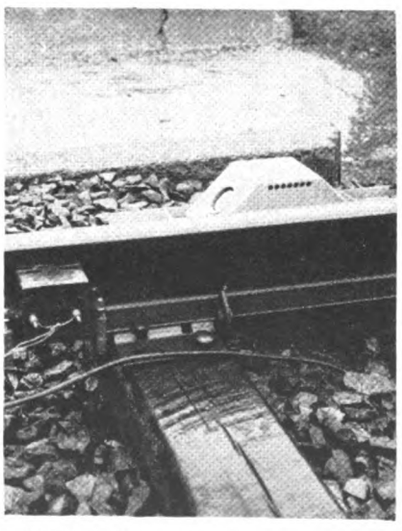
The detector is protected by a metal enclosure with a shutter over the pyrometer lens. This shutter opens as the train approaches and closes after it has gone. Indications from the detector are placed on a paper tape monitored by an employee on duty at the wayside recorder. Servo is developing an arrangement which would convert hot journal indications directly into a signal aspect which would cause the train to be stopped. The tape can be analyzed to indicate which car has the hot box, and this same information might be produced with a counter in an automatic set-up.



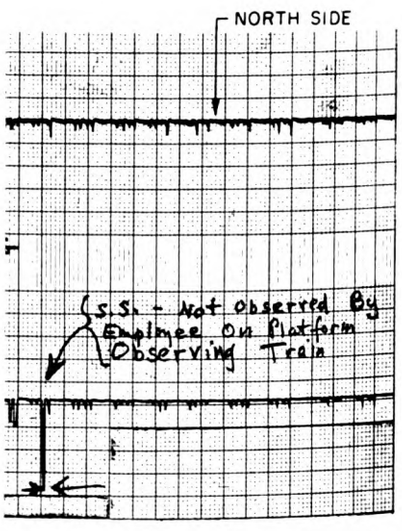
Components of Servo hot-box detector system convert infra-red journal temperature indications into paper tape record at wayside station.



Principle of detection system is to "sweep" box or side frame as it passes. Its infra-red radiation is picked up by pyrometer in detector.

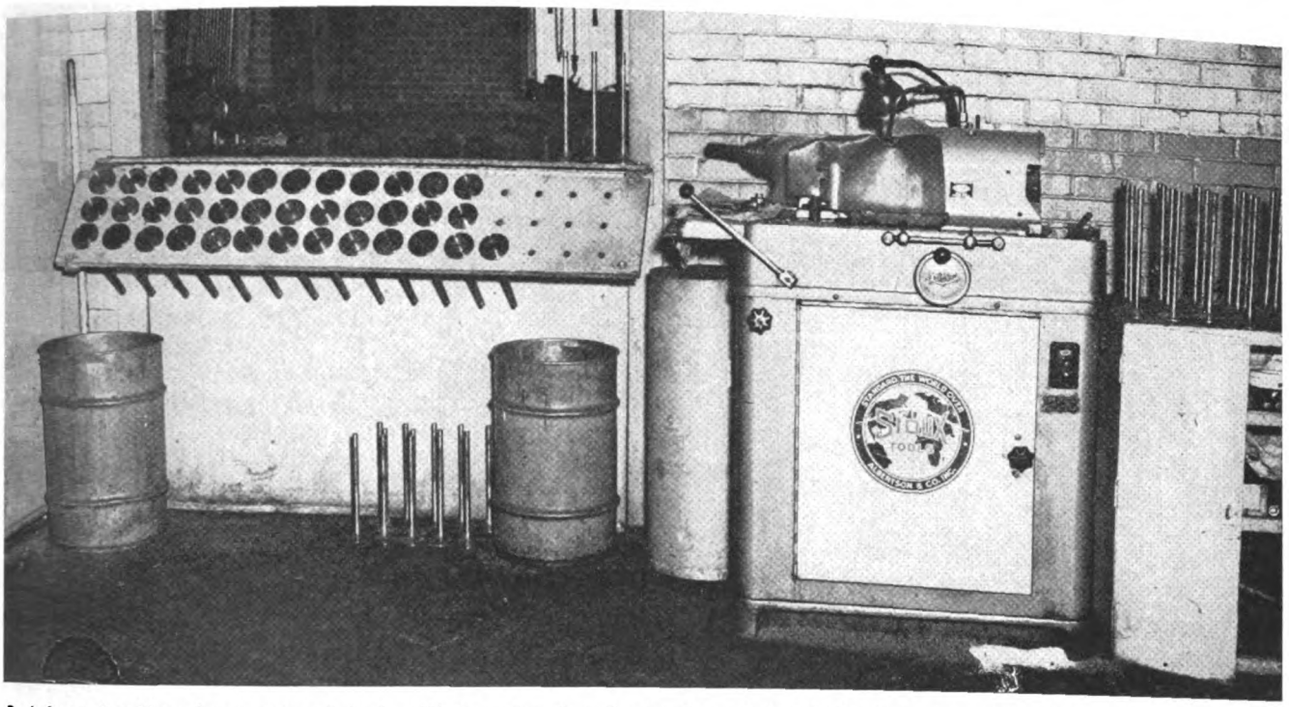


Installation places two of these detectors opposite each other and outside the two rails. Transducers are clamped to each rail beyond detector to energize and de-energize the detector circuits.

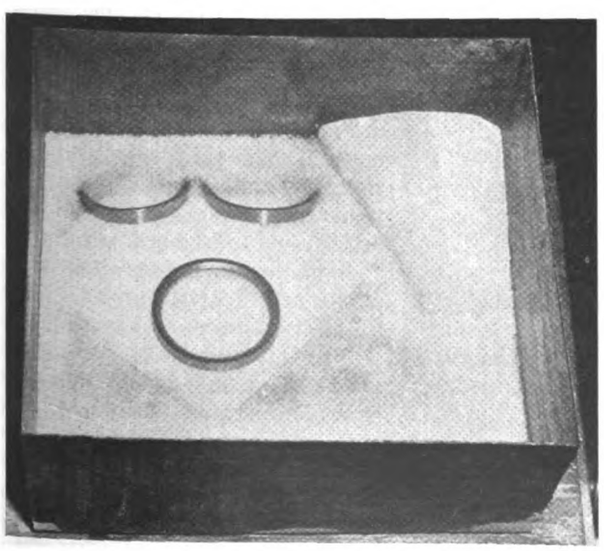


Indication at wayside is checked by operator. Temperature of each box is indicated. "Pip" marking hot box is usually five times higher. Roller bearings run at similar temperatures, complicate automatic detection.

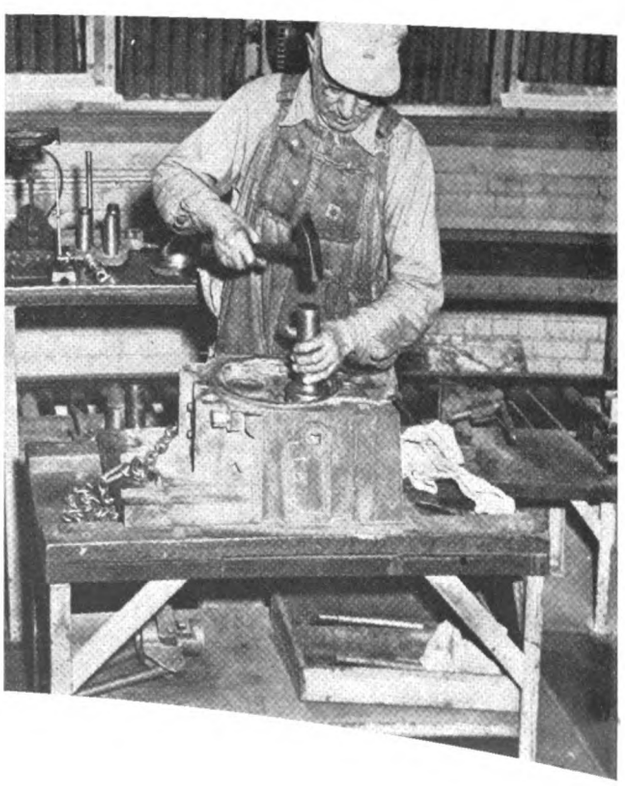
Ideas for the Diesel Repair Man...



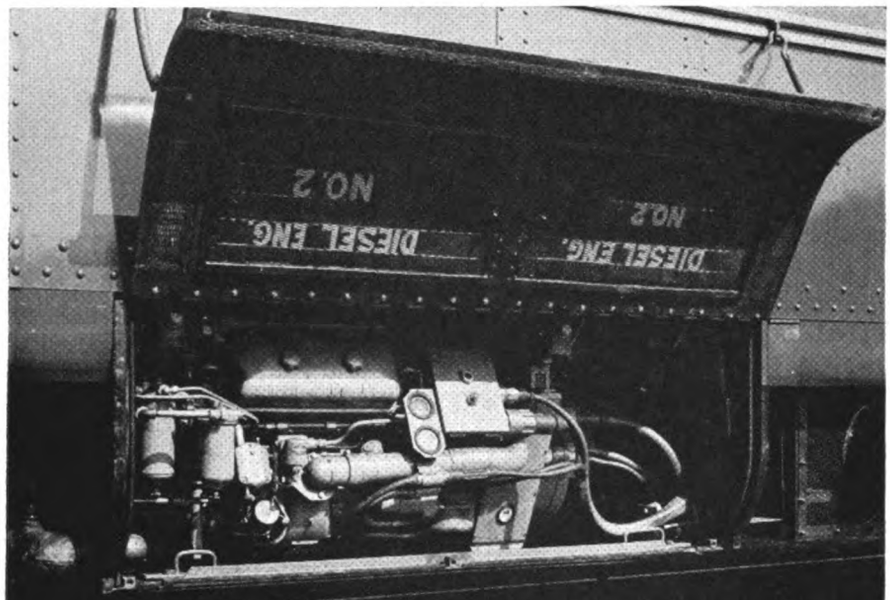
Rack for storing Alco valves next to grinder in a Western shop. A similar board mounted at 45 deg is used for EMD valves.



Valve seat inserts shrunk in dry ice and alcohol for easy insertion with a hand tool. The inserts are turned .0035 to .0045 in. oversize in diameter and chilled to between minus 65 and 75, which takes 20 to 30 minutes. Both stellite and softer seats are used, the latter being put in heads with older type valves.



RAILWAY LOCOMOTIVES AND CARS



One of the undercar power plants which provided 18,000 hours of satisfactory service before being given a major overhaul.

The energy required for both cooling and heating can be generated on each car of a passenger train. Both undercar power plants and reverse cycle heating are practicable.

Independent Car Goes Anywhere.....

LOCOMOTIVE-HAULED passenger cars can be completely independent of the locomotive for everything except traction. The energy required for both cooling and heating can be generated on each car.

There are two main methods of accomplishing this scheme of heating without the use of train line steam or individual oil-fired car heating systems, namely undercar diesel engine-driven power plants, and reverse cycle heating.

Undercar Power Plants vs Head-End Power

The Pennsylvania has a total of 12 cars equipped with undercar power plants which have been in successful operation for nearly five years. The units are now being given a major overhaul after more than 18,000 hours of service. These units which are on dining cars and coffee shop cars (two units per car) consist of a 25-kw, 220-volt, 3-phase, 60-cycle, 1,200 rpm alternator, direct-connected to a General Motors, Detroit diesel 2-cycle, 3-cylinder engine. Waste product heat from the jacket water of these engines is used to heat the car in the winter season and waste product heat from the engine exhaust gases is used to heat service water at all seasons of the year.

Recently built, lightweight trains develop power for train facilities from power cars or from the locomotives. In comparing the total first cost of the individual undercar power plants with the total cost of a head-end system, including the cost of a power car, switching and transmission line, the head-end system will be considerably higher in first cost. Further, the head-end power car is a non-revenue unit and represents additional drag on the locomotive. If a power car is not used for head-end power, the central source of electrical power must then be placed in the locomotive. There is not sufficient room in existing locomotives to accommodate two generating units and associated controls. If existing locomotives are not used, then a large expenditure will be required for the new locomotives.

Individual diesel-operated power plants on each car provide power for all train power requirements. Actual figures on cost of maintenance are not available but the following is a comparative analysis of this problem. From a maintenance standpoint, the individual undercar power plants may be slightly higher than that of the head-end system, but this will be offset to a large extent by maintenance on the trainline switching and transmission systems.

As far as operation is concerned, considering flexibility and reliability,

the individual car has a decided advantage over the head-end system. The car is self-contained, and can be operated anywhere. Further, a failure of the trainline transmission system affects all the cars in the train, causing the car electrical and air conditioning apparatus to become inoperative; whereas, a failure of an undercar power plant affects only that car. Also, any failure of truck or brake system on the power car necessitating its removal from the train means annulment of the train, unless protect power cars are provided for this type of emergency.

Reverse Cycle Heating

Reverse cycle heating for railroad cars is not new. The Pennsylvania had two cars equipped with this system in 1935, and they operated satisfactorily for several years. The manufacturer of the apparatus then decided to leave the field, and the apparatus was removed from the cars because repair parts were not available.

Cars having reverse-cycle heating will be supplied with electrical energy in the yard from the 220-volt, 3-phase, 60-cycle standby facilities. During the cooling season, the heat is absorbed by the evaporator and rejected to the atmosphere by the condenser. In the heating season, the refrigerant cycle is reversed and the outside heat is brought into the car.

When the car is in service, electrical energy is obtained from an axle-driven motor-generator set. The motor-driven compressor is a 2-stage 3-cylinder unit, rated 10 tons, driven by a 15-hp motor. The two-stage unit has a considerably higher efficiency than a single-stage unit. Hence, correspondingly higher tonnage can be obtained for the same power input with the two-stage unit. During the cooling season, the compressor will be operated at a lower speed because only eight tons are required.

Further on a thermal basis, the reverse cycle system compared with direct electric heat is approximately two to one for the same power input. This gain in heat arises from two sources, namely, heat from the outside air and heat of compression.

As far as first cost is concerned, this system will be somewhat higher than that of the undercar power plant scheme, but considerably lower than that of the head-end power method.

From a maintenance viewpoint, it will be substantially the same as that of the undercar power plants.

From an operational standpoint, the reverse cycle system has the same advantages of flexibility and reliability as that of the undercar power plant scheme.

In comparing these systems with conventional steam heating of cars, the following disadvantages of steam heating must be evaluated.

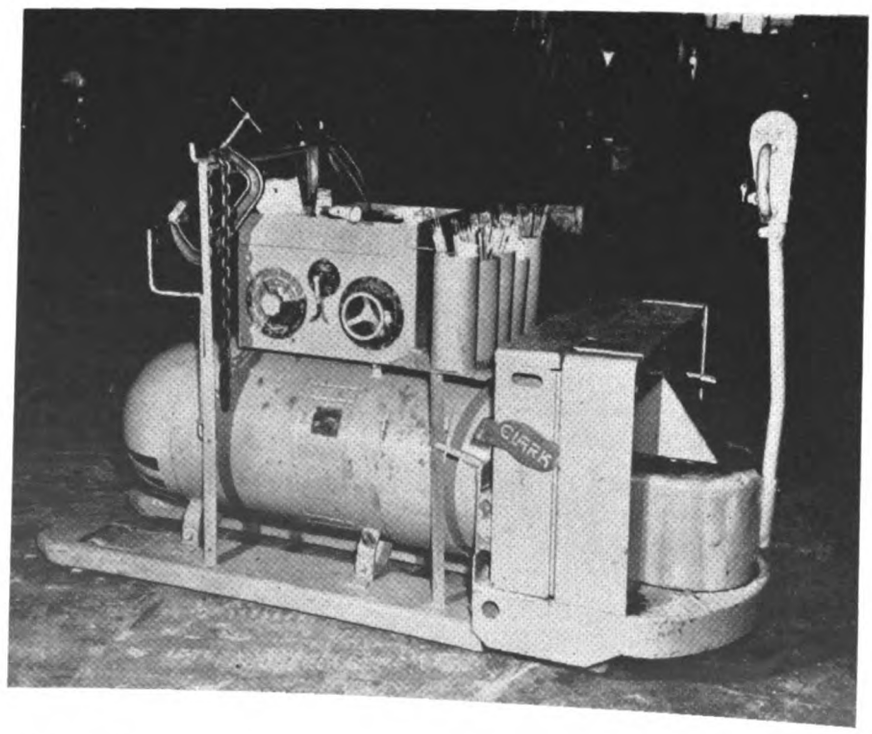
1. In cold weather, the length of the train must be limited to avoid poor heating of the rear cars.
2. Loss of train time and additional labor required to thaw frozen traps and trainlines enroute.
3. Cost of generating steam at the various terminals and coach yards.
4. Cost of maintaining these steam generating plants and distribution systems at the terminals and coach yards.
5. Yearly maintenance of the steam heating systems on the cars and locomotives.

Frequently, in analyzing this problem of car heating, all the costs of steam heating are not carefully considered, and only the items relating directly to the operation of the car are included. Another handicap for the independent car is that the necessary equipment raises the first cost of the car. However, both undercar power plants and reverse cycle heating are practicable, and when all phases of the problem are properly evaluated, they apparently offer a considerable improvement in overall economy with better utilization of cars.

Self-Propelled Portable Welder

BY PERMANENTLY MOUNTING a welding set on a Clark battery-powered hand truck, the welding operators in this shop were able to considerably reduce the time required for on-the-spot repair jobs. The 450-amp welding machine is bolted to the forks of the pallet-type truck and the control panel is welded to the top of the motor case.

On the front end of the unit scrap angle irons and a thin sheet were fabricated into a table. Five round steel containers were welded to the table to hold welding rods. At the rear, scrap angle irons were set up to form a frame from which clamps, cable and other equipment may be hung. The unit carries 50 ft of cable for power supply and 20 ft of welding cable.



3 Roll Them Out Like New

Disassembling Equipment Requires Skill and Understanding

NOT ALL EQUIPMENT DAMAGE can be blamed on shipment. Even though the apparatus reaches the shop undamaged, the hazard of handling still remains. The shop, like a hospital, should be a haven of safety and security. But there is no magic in simply passing through the doors that guarantees this. Only the skill and understanding of the workmen can make it real. For instance, tilting a generator so as to cause the armature to slide in its bearings is just as damaging when it happens in the shop as when it happens in the field.

Care Still Needed

Even though the assembled machine has survived all the hazards of handling in the field, the roller bearing is not yet safe. It may be wrecked when the armature is moved in or out of the frame. The weight of the armature should not be allowed to slide on the bearing rollers as it is moved. Also, care should be taken to move the armature evenly and in a line so that it doesn't cramp between the rollers. If the frame head with its bearing is removed first, there is not as much weight to handle. However, it can still cramp the bearing if it isn't balanced in the hoist. Cramping can create terrific pressures on the rollers. These pressures can easily exceed that caused by armature weight. Damage from cramping is identified by heavy marking on opposite sides of the bearing races.

In view of these precautions it is well to consider how best to do the job of disassembly. Some shop people like to move armatures in and out horizontally. A good job can be done with shaft extensions, double hoists and special slings. Others think the risk is less if the machine is upended and the work done in a vertical position. This method has a number of advantages when it comes to handling the heavy field coils, pole pieces, frame head and even the armature, for easy, direct vertical lifts can be made with a hoist. Usually the facilities available, the builder's recommendations and personal preference are the deciding factors. In any case, if you know what to look out for and understand what must be done, you can work out the method best suited to your needs.

Field Coils

If a complete machine can get into trouble during handling, its individual parts after disassembly are in even greater danger. Take the heavy exciting field coils of a traction motor or generator as an example. There is a great temptation to drag or slide them from place to place rather than lift them. The outer insulation of

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This is the third article in a new series covering heavy maintenance of locomotive electrical equipment.

Part 3 is written by J. W. Teker, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

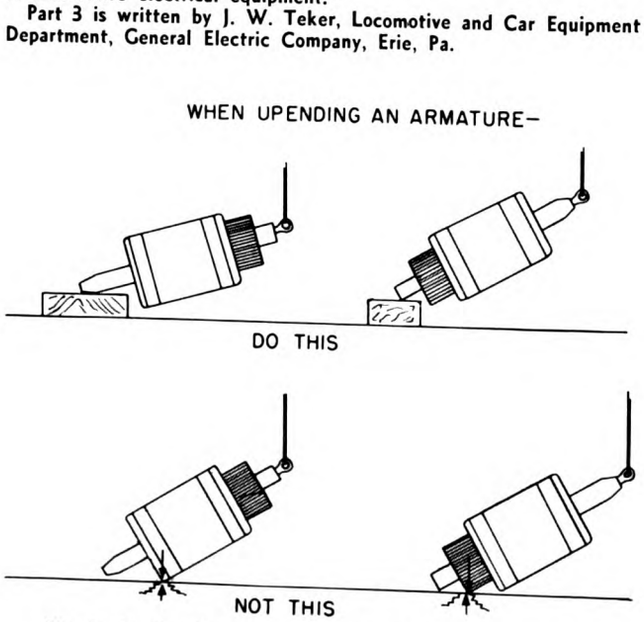


Fig. 1—Right and wrong methods of upending an armature.

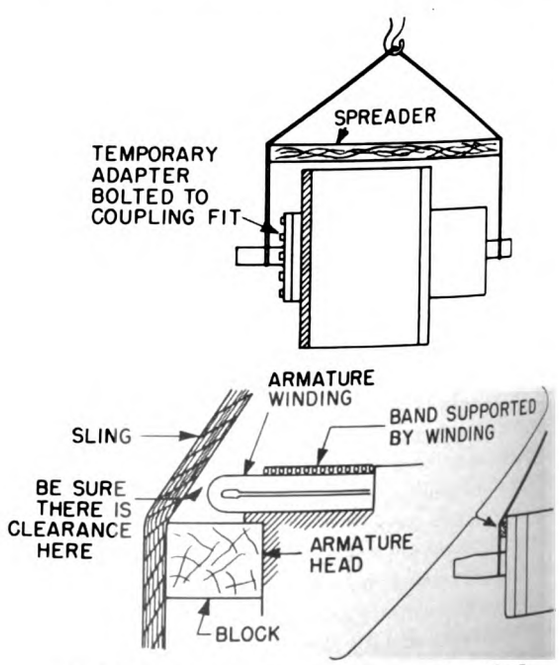


Fig. 2—Precautions when using slings to lift armatures.

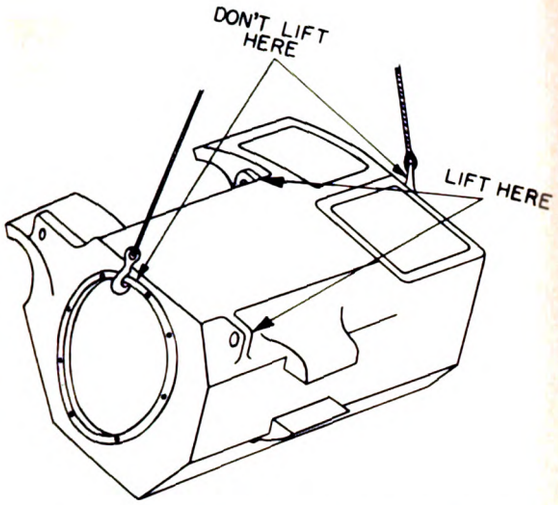


Fig. 4—Crane hooks should be attached to lifting bails, not to accurately machined frame-head bores.

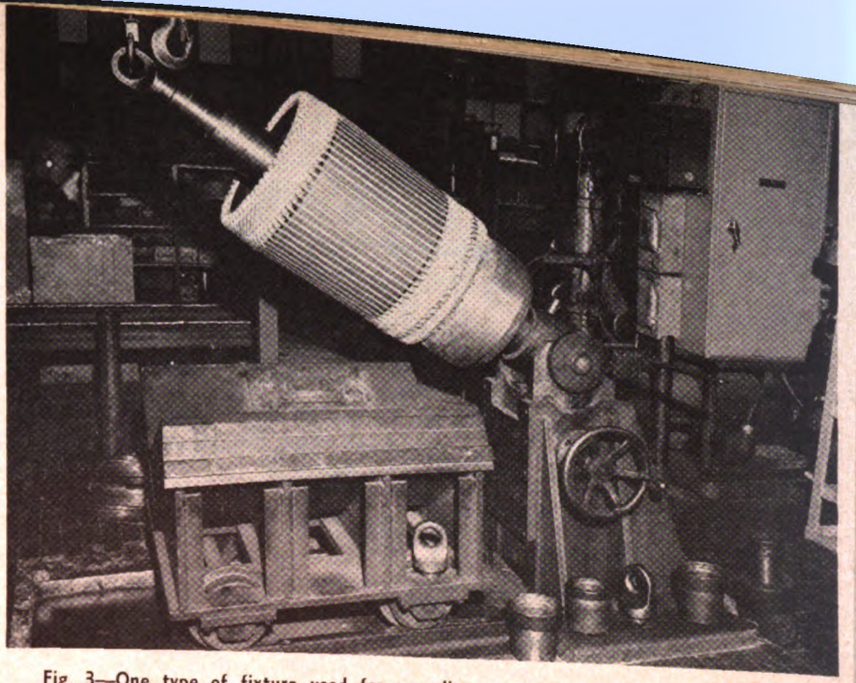


Fig. 3—One type of fixture used for upending armatures.

these coils can withstand high compression without damage when it is squeezed between the pole piece and the frame. But if it is rubbed across a rough surface, a sharp edge, or a nail head in a shelf or bench it cuts through. A very frequent source of grounded coils is steel chips imbedded in the insulation. This results from setting coils down on unswept surfaces, such as fork truck pallets or stock room floors. Unfortunately the damage is on the under side and the coil must be turned over to see it. Even then you can miss it unless you are looking for it. Sometimes it can be felt better than seen. But such close inspection is rare and the defect is usually found by high-potential test. Worse yet, it may go undetected and cause a failure in service. This shows the need for cleanliness and good housekeeping, and for separating machining operations from assembly.

Armatures

Most important of all, know the job and the strong and weak points of the parts you handle. Probably the best example of this is an armature removed from its frame. The shaft is the strong backbone of this part. Even so, it has its touchy places. The centers on each end of the shaft are on example. They are the necessary reference points for the life of the armature. Don't clobber them up with sledge hammer blows or the undistributed pressure of a powerful hydraulic press. The bearing fits are machined to half thousands tolerance. Protect then from rust or nicks. This goes for the tapered pinion fit also. A hand file used to remove a nick can take with it valuable contact area. Wooden cradles are frequently used to support shafts during shipment. It would be hard to find a more suitable material for this purpose. Watch out, though, for sap or moisture in the wood. They can cause a badly rusted spot. First protect the shaft with slush or wrap it with a vapor-barrier or rust-preventive paper.

The core, or magnetic part of the armature is heaviest. Yet in many ways it is weak. It is made up of hundreds of thin iron sheets pressed into a compact stack with a thin coating of insulating varnish on each sheet. There is a good reason for this construction. The same magnetic force which causes electricity to flow in the copper armature coils would also cause current to flow in a solid iron core. This would overheat the machine and burn it up. So it is necessary to slice the iron up and put insulation between the sheets to hold the core current to a low value. Anything that breaks down this insulation and connects the iron sheets (laminations) will increase this core current. So, be careful not to file, jam or drag these laminations together.

Handle the core with care, it's not just a chunk of

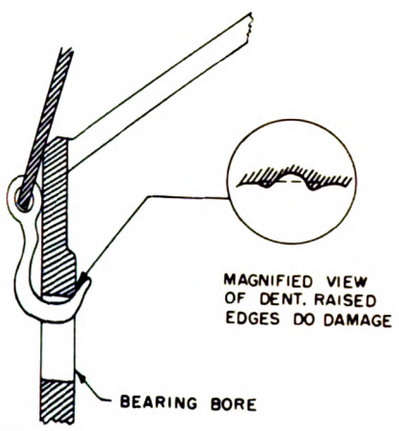


Fig. 5—Hooking into bearing bore when lifting frame head can do serious damage.

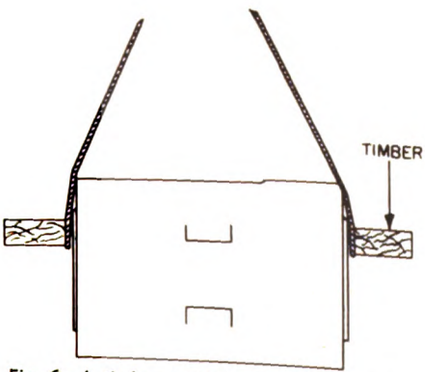


Fig. 6—A timber can be used to protect machined surfaces when lifting a magnet frame.

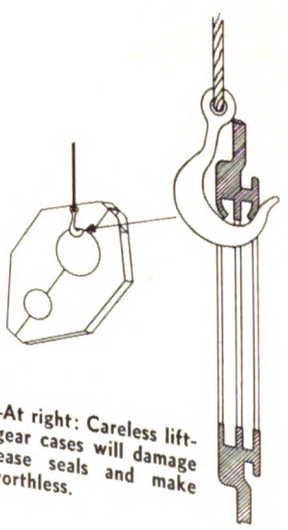


Fig. 7—At right: Careless lifting of gear cases will damage the grease seals and make them worthless.

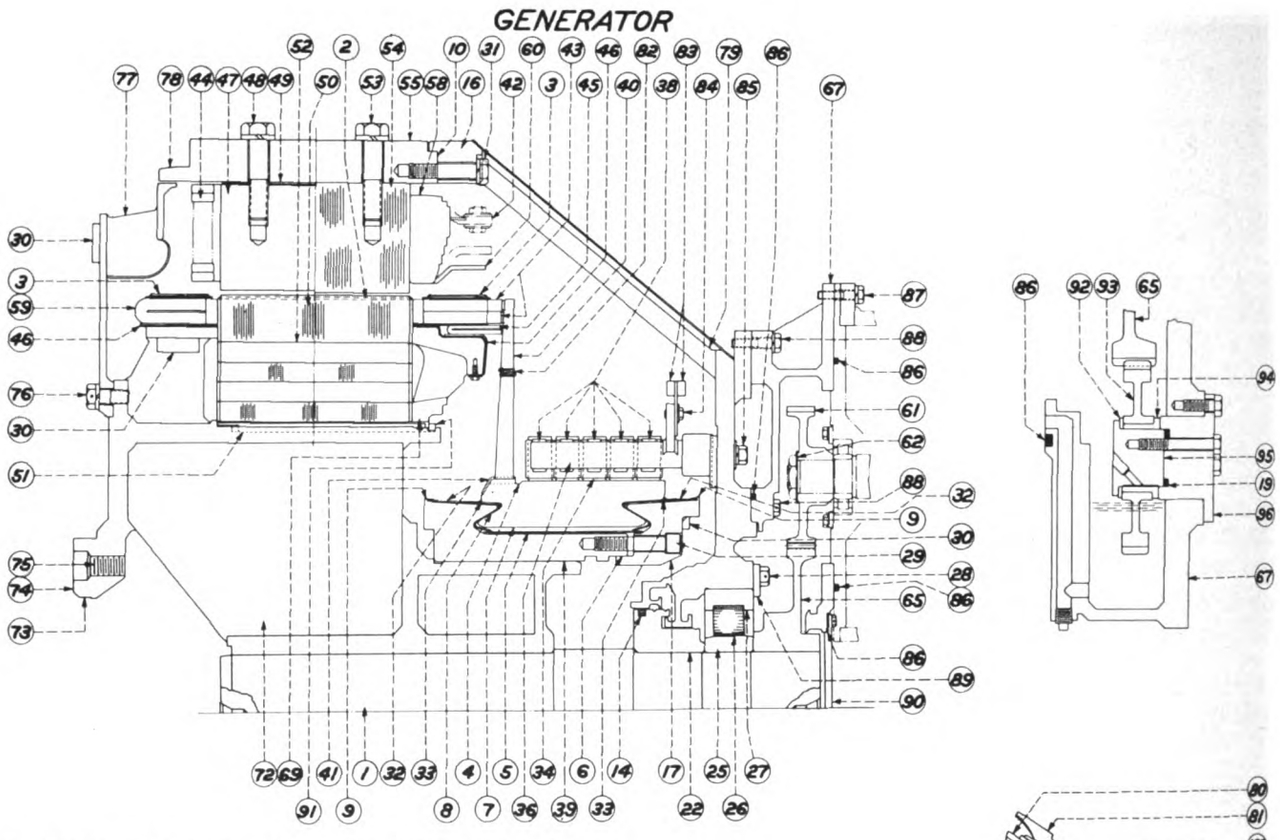
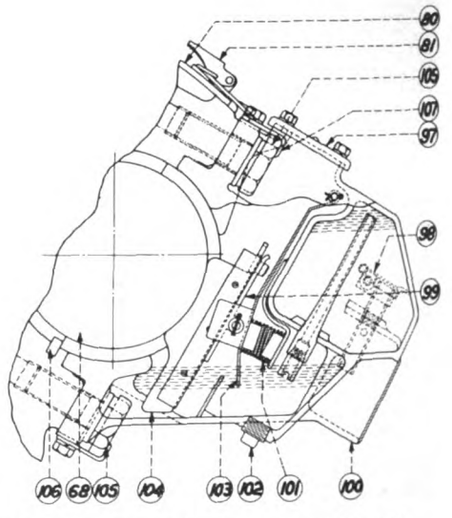


Fig. 8—Nomenclature chart for *motor* (on facing page) and for generator (above).

1. *Armature shaft*
2. Arm. coil retaining wedge
3. Arm. binding wire & clips, comm. end, pinion end, or fan end
4. Commutator dust groove
5. Commutator shell insulation
6. Commutator cap & shell fit
7. Commutator segments
8. Commutator cone insulation
9. Commutator bead ring
10. Frame head & mag. frame fit
11. Axle bearing lining
12. Axle bearing lining flange
13. Wheel hub
14. Felt seal
15. Axle lining flange dust guard
16. Frame head, commutator end or pinion end
17. Commutator cap
18. Bearing cap, inner comm. end, or pinion end
19. Gasket
20. Flinger
21. Roller bearing separable lip or H-piece
22. Collar
23. Bearing cap, outer comm. end or pinion end
24. Bearing retaining nut
25. Roller bearing, inner race
26. Roller bearing, roller
27. Roller bearing, outer race
28. Cap screw or bolt
29. Commutator bolt
30. Balance weight
31. Bolt, frame head, comm. end, or pinion end
32. Commutator string band
33. Commutator seal
34. Carbon brush
35. Brush holder clamp
36. Brush holder stud
37. Bolt, brush holder clamp
38. Brush holders
39. Commutator shell
40. Commutator riser
41. Mica segment
42. Comm. field coil terminal
43. Armature coil lead, top & bottom
44. Commutating field coil
45. Equalizer
46. Armature head insulation
47. Commutating pole piece
48. Commutating pole bolt
49. Commutating pole shim
50. Armature core punchings
51. Armature core key & keyway
52. Armature core air holes
53. Exciting pole bolt
54. Exciting pole piece
55. Magnet frame
56. Steel pad for exc. field coil
57. Spool flange
58. Exciting field coil
59. Armature coil, loop end
60. Exciting field coil terminal
61. Pinion
62. Pinion nut & washer
63. Bearing seal collar, P. E.
64. Hole for gear lub. return
65. Gear
66. Gear lubricant deflector
67. Gear case
68. Axle
69. Armature head
70. Oil seal washer, axle side only



Section through motor support bearing—commutator end.

71. Bolt lock piece, axle side only
72. Armature spider
73. Coupling fit bore
74. Couplin fit face
75. Coupling bolt holes
76. Fan bolt
77. Fan
78. Engine—gen. mounting fit
79. Frame head arms
80. Commutator cover
81. Commutator cover latch
82. Commutator riser tie
83. Brush holder bus rings
84. Brush holder stud terminal screw
85. Bolt for brush holder stud
86. Gasket for gear case
87. Auxiliary machine mounting bolt
88. Gear case mounting bolt
89. Bearing clamp ring
90. End cover
91. Armature head lock key
92. Oiling gear thrust washer
93. Oiling gear
94. Oiling gear bearing
95. Oiling gear shaft
96. Oiling shaft support
97. Axle cap inspection cover
98. Axle cap filler cover
99. Wick lubricator support
100. Axle cap
101. Pusher plate spring
102. Drain plug
103. Pusher plate
104. Wick lubricator
105. Axle cap bolt
106. Axle lining key
107. Locking device

iron. Don't drag it lengthwise across a bench or floor. This might bend or flare the teeth of the laminations at the ends of the core. It is almost impossible to press such flared teeth back against the core. They have no support when flared away from the core and will buzz when the machine is in operation. Ultimately such teeth break off and can jam in the machine. If a broken tooth can't escape, it rattles around in its pocket like a pea in a pod. This chews out coil insulation and leads to a ground failure.

When an armature is rolled for even a short distance, make sure that the surface over which it rolls is smooth and clean. A heavy armature can't roll over nails, bolts or nuts without being dented and damaged. It is easy to jam a chip into the winding, or to crush or break off the end of a slot wedge.

The edge of the core is the weakest spot because here the thin laminations have the least support. Some cores have fingers or extra heavy punchings for support of the thinner laminations. Even these will give way, however, if the entire weight of the armature is tipped onto its edge. This will crush the teeth and damage the armature winding enclosed by them.

The core slots and wedges enclose and efficiently protect the slot portions of the armature coils. But after the winding leaves the slot it is exposed and helpless. A banding of steel wire covers part of these exposed ends. Don't let that give you a false sense of strength, however. Remember, the winding supports the band. Any blow or dent inflicted on the band is passed on to the winding underneath. And this winding is no stronger than the mica, glass, cloth or varnish insulation covering and separating the copper conductors.

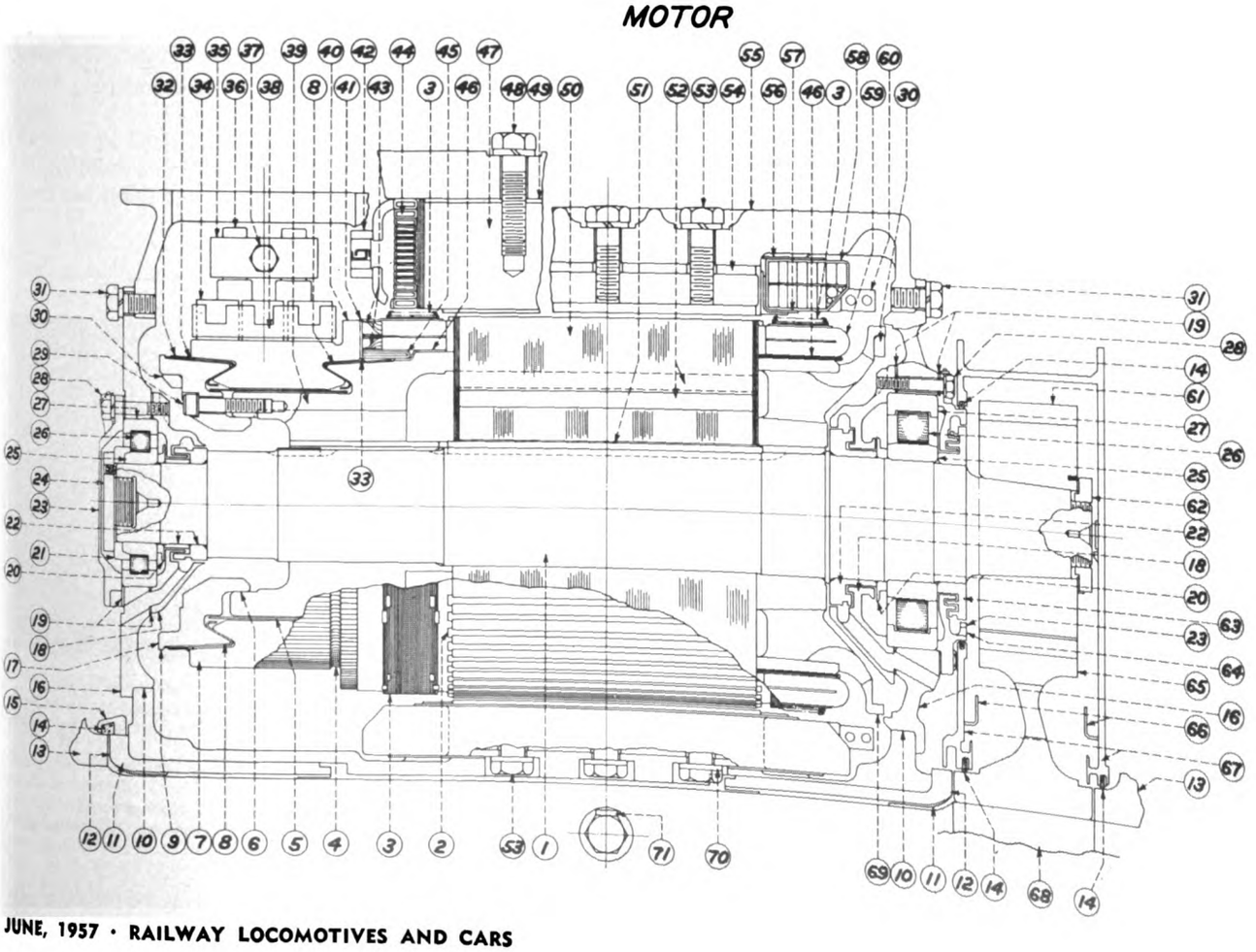
The end of the coil opposite the commutator—called the nose, knuckle, or loop—is the part most frequently damaged by careless handling. It sticks out like a chin and attracts trouble. Watch for it.

Assembled in its frame, this part of the armature works year after year without trouble. On rare occasions some misguided soul will pry on these loops or knuckles when he wants to bar the armature over. They look like a "natural" for this purpose. Soon after such treatment the armature comes into the shop. Then you have a rewind job on your hands; or else a challenge to your skill—like a surgeon—to save it with a repair job.

More frequently this part of the winding is damaged simply because it sticks out where it gets hit or crushed. Careless turning of the armature between horizontal and vertical positions can bring all its crushing weight on these loops. For safety's sake, place a block under the end of the shaft, Fig. 1 to act as a pivot so there is no pressure on the end windings. If armatures must be turned frequently, as in a shop, a fixture with a hinged pocket for the end of the shaft, Fig. 3, is safer and quicker. If a sling is used to make horizontal lifts, make sure that it doesn't dig into the end windings. A spreader or block can be used to keep the sling away from the winding.

Commutators

Probably the least understood part of the armature



is that combination of copper steel and mica called the commutator. It is the switching device that makes a direct current machine possible. Its hundreds of separate copper segments are sandwiched between comparatively softer mica strips. The commutator surface must be smooth and round. As we shall see later, this surface is maintained by a delicate balance of internal forces. Surface blemishes, such as nicks in the copper can be seen. A bump that doesn't leave a visible mark is worse. It may upset the delicate balance by depressing a section of the surface and cause a low spot. Such a spot may remain invisible until it causes trouble in service, or until you hear or feel the brushes click when it passes under them.

Avoid making lifts on the commutator or blocking under it. Use the same care to keep the armature weight from pressing on the outer edge of the commutator when upending the armature as you did with the end winding. Place a block under the end of the shaft, Fig. 1, to take the load or you will sink the ends of the bars.

When you are not working on the commutator, protect it with a wrap of cardboard or a felt-lined metal guard. Then, if it is bumped the pressure will be spread over a larger area and there will be less force in one spot. This protection also safeguards the surface against nicks, scratches, and spots of paint or grease.

If an armature must be supported use blocks under the core that are cut to fit, and steady it by blocking around the shaft. When shipping an armature it is best to use a box. This can have built-in skids and cradle blocks, and be fitted with a waterproof lid.

Frames and Frame Heads

The non-rotating parts of electric machinery look husky enough, but they also have their sensitive points. A good example is the frame-head bores with their accurately machined surfaces. These form a tempting place to attach crane hooks when lifting the frame, as shown in Fig. 4. Doing this can leave a serious dent with raised edges in the machined surface. Such handling shows that the shop man either has a devil-may-care attitude or just doesn't know his job. Someone must take time to dress out a dent like this before the machine can be assembled.

Even worse is the practice of hooking into a bearing bore, as shown in Fig. 5. Damage of this kind may go undetected at assembly. Then it can cause misalignment of the bearing or throw it out of round. When the bearing shows up noisy on a listening test it is no picnic to hunt down the cause of the trouble.

Another much-abused piece of equipment is the traction motor gear case. When you look at it, it is a dirty messy thing; but it has an important job. Don't let its appearance fool you, for it has an important job to do. Locomotive gearing must transmit high horsepower and tractive effort between the motor and the wheels. The gear case enables the gears to do this job. It holds the lubricant they need, and also keeps grit and stones out of the gearing. But it will fail in this job if the seals around the openings are damaged. So don't yield to the temptation to put a crane hook into the pinion or axle bore, Fig. 7, when lifting the case. The edges of the slots for the felt seals are easily bent or broken. There just isn't space here for husky seals, so be sure to handle them with care. A minute rightly spent will avoid damage requiring hours to repair.

Knowledge Begets Care

There is no substitute for a thorough knowledge of the anatomy of the machines you are handling. The nomenclature chart, Fig. 8, will help you to identify the principal parts of motors and generators. Most of these are well known, but some part names may vary with the builder. Take every opportunity you can learn more about the machines you work with so you will understand their points of strength and weakness. It is easy to devise proper lifts, once the need to respect machined fits and surfaces is understood. Good work here is the mark of a man who knows both his job and his machines.

Whether we are working in a hospital or a repair shop, the same principle applies. A moment of thoughtless or careless handling can undo the finest and most skillful work.

A three-part railroad car for carrying extra heavy loads is now in service on the Swiss Railroads. Like the three-part Westinghouse car described in the April 1957 issue of ***Railway Locomotives and Cars***, the center section is the load itself.

When the car is moving light, the two end sections are coupled together to make a two-part car.

The load is suspended between two trusses which distribute the load proportionately on the two rolling parts, each having three 6-wheel trucks. The load is so mounted that it may be displaced 1.15 feet to either side to allow greater lateral clearance on curves.

The dead weight of the car is 201,500 lb and the load capacity is 605,000 lb. The length of the car without load with both parts hooked together is 110 ft.

It is said the car greatly influences the capacity of new power plants which are being built in the area. The Transporter is shown carrying the stator for a 214,000-kva power plant generator from the Brown-Boveri plant in Munchenstein, Switzerland to Frimmersdorf, Western Germany.

Starting an Engine . . . By Telephone

By Gordon Taylor

A FREIGHT TRAIN, hauled by two GP9 units in multiple, came to a stop a long way from home. The engines would not load and the PCS light was burning, which seemed to indicate an open PC switch. Then both units died, and the crew tried everything they could think of to restore service. There had been no reason for the PC switch (air-operated) to open. The air pressure was okay, and air brakes had not been applied at the moment of failure.

After some 30 minutes delay, the crew was able to contact the diesel shop foreman by phone. He suggested that the crew close the control and fuel pump circuit breaker, and also the engine run circuit breaker on the rear unit. When this was done the engines were started without difficulty. The locomotive was back in business after about a one hour delay. Incidentally, the PCS indicator light continued to burn for the balance of the trip.

It was embarrassing to the engine crew to have such a delay, when such a simple remedy was available. The engineer and fireman decided to have this case of trouble thoroughly explained to them, and when they reached the home terminal, they called on "Doc" Watts, the electrical foreman.

Kelly Watts was glad to cooperate. But he first wanted to definitely locate the exact cause of the trouble. He reasoned that the pneumatic control relay (PCR) was involved because the crew had reported that one of the first trouble indications was the burning of the PCS open light. This light burns when current flows through the e-f interlocks of an open PCR. The question was, what caused the PCR to stand open? It was quickly found that the PCR coil was open, and it was necessary to replace it with a new coil to make permanent repairs.

With the trouble definitely identified and corrected, Watts outlined the case to the engine crew, tracing the circuits on a schematic wiring diagram. He explained the case as follows:

To start the diesel engine and control its speed from the throttle, the control-and-fuel-pump and the engine-run circuit breakers must be *On*. To move the locomotive, the generator-field circuit breaker must also be *On*.

The control and fuel pump breaker when closed on the lead unit energizes the PC wire, one of the wires in the control cable that runs throughout the locomotive. The PC wire has a tap leading to the throttle control, which in *idle* position closes a circuit through pneumatic control switch (PCS) which is an air operated electric switch. The closed PCS passes current to the operating coil of the pneumatic control relay (PCR).

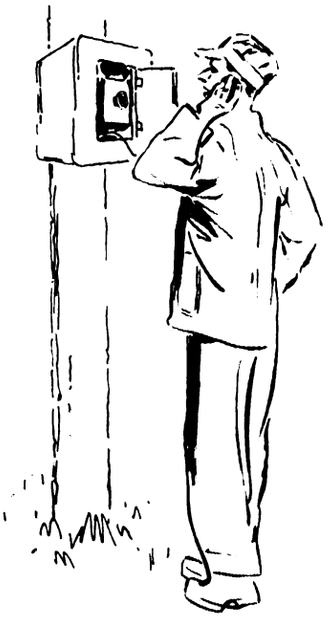
The PC wire has another tap leading directly to the operating coil of the fuel pump contactor (FPC). When FPC is energized its interlocks c-d serve to provide a holding circuit through coil PCR when the throttle is moved off the *idle* position to all *run* positions. The *PC* wire also has a tap passing through the isolation switch that makes it possible to energize the starting contactor when the start push button switch is pressed closed. The *PC* is a very important wire.

It is now time to consider what the *engine run* circuit breaker does in the control system. When this breaker is closed, it energizes the fuel pump (*FP*) wire which runs throughout the locomotive. It energizes the *FP* wire provided the a-b interlocks on *PCR* are closed. The *FP* wire when energized carries current to the fuel pump controls on the trailing units. It also carries current through the isolation switch to the engine relay (*ER*) in each unit. The engine relay in turn controls the current supply to the A, B, and C solenoids of the electro-hydraulic governor control, that controls engine speeds. De-energizing the *ER* will stop the engine if the throttle is in *Run 5* or *Run 6*, or will bring the engine to idle, if in any other throttle position.

The engineer wanted to know how the *PCS* light got into the act. The electrical foreman explained that the warning light had nothing to do with it except that it indicated that something had happened to the *PCR*.

The *PCR* tied in as the cause of the trouble because its open coil circuit caused its a-b interlocks to interrupt the circuit between the engine run circuit breaker and the *FP* wire.

The FP wire carries current to



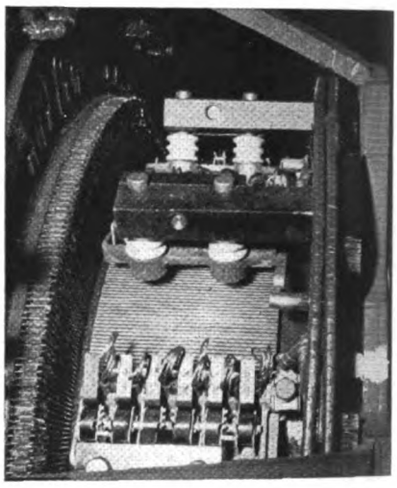
This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

the fuel pump controls and to the engine relay which is necessary to energize the A, B and C solenoids in the engine governor. Since the FP wire was dead on the control unit, it caused a failure of both units.

From the information phoned in to the diesel house, it appeared necessary to energize the control system from the rear unit. It happened that only the engine run circuit breaker needed to be closed on the rear unit to restore control current on the control unit. However to be safe, it was suggested that both the control and fuel pump breaker and the engine run breaker be closed on the rear unit.

How Much Do You Know About Brushes

How Significant Are Brush Connections?



A BRUSH CONNECTION must be designed to carry the maximum current load, and be of uniform low electrical resistance, free from mechanical failure, and able to withstand the fatiguing effect of constant vibration and shock through the life of the brush. An inefficient connection can be a source of additional heat to the commutator because of the I^2R or heating effect caused by high resistance. Inadequate cable size or poor carbon-to-connection contact results in unnecessary heat and power loss. Connections which do not remain stable at their initial low resistance level become inefficient electrically. If the difference between connection resistance of brushes in the same holder becomes great enough, the major portion of the current will flow through the brushes with the lowest connection resistance. This is called selective action. It can cause differences in the appearance of the film tracks and excessive heating of the brushes. It is especially undesirable on generators.

Most railroad people are familiar with the troubles which can occur as a result of the mechanical failure of brush connections. With certain types of riveted or tamped (plug) connections the brush tends to break at the connection thus allowing the loose shunt to dangle. Eventually, it causes a flashover or trips the ground relay of the unit when the shunt comes in contact with some part of the frame or mechanism which can serve as a ground. In the early days of the diesel locomotive, this type of failure reached epidemic proportions on some roads due to extremely severe operating conditions. Thanks for brush connection development, this type of failure is eliminated when connections are used which are designed to withstand the stresses present on diesel locomotives.

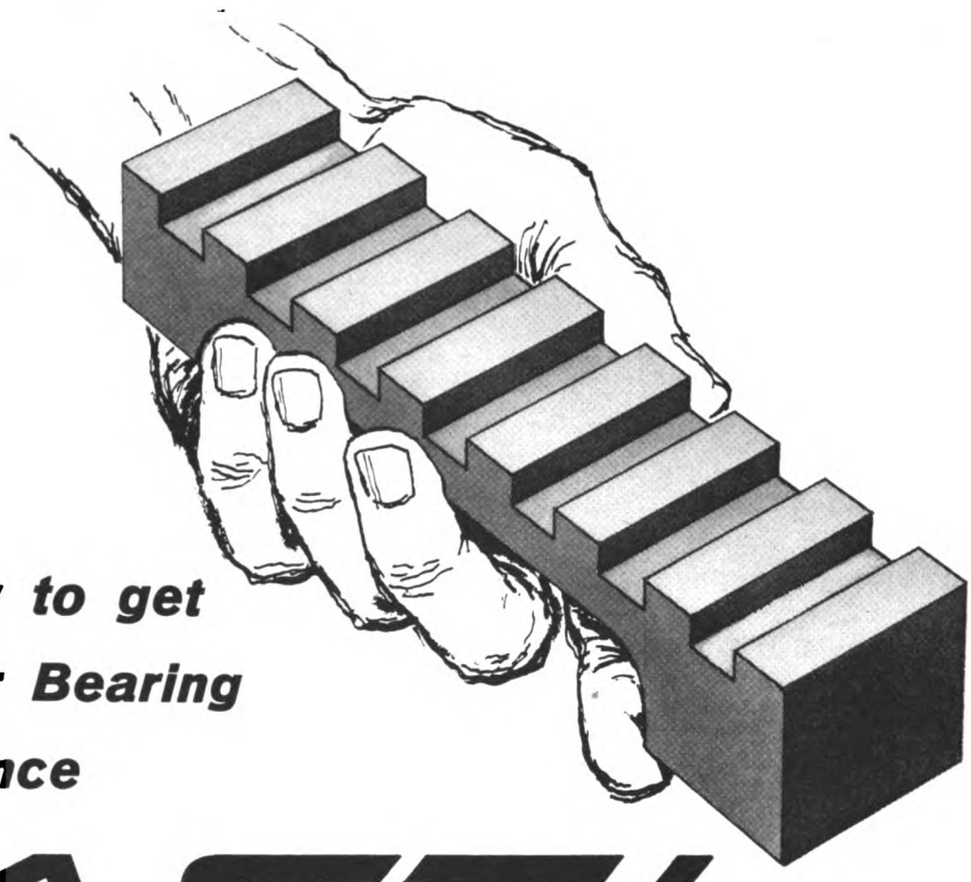
Fatiguing or fraying off of shunts on connections has had a history parallel to that of mechanical connection failure. Here, too, development work has produced a satisfactory connection. However, based on the past experience, it seems quite probable that no connection material tested today has sufficient fatigue life to outlast the life of a second or possibly third set of traction motor brushes if the connections were to be re-used. A tight connection is essential if the cumulative effect of high resistance and heat is to be avoided.

There have been many, many proposals and patents of novel connections each of which theoretically had something better to offer. The rigors of actual service have served to lead to the present day standard connections used on diesel motors and generators. Usually, the proposals have been made for economic reasons and give little consideration to the efficiency of the connection or the job it must do. Experience has shown that the stresses imposed on a connection will quickly shake it loose if it is not firmly connected to the brush. The slightest loosening of the connection is the beginning of its destruction. Any loose connection intended to carry high current densities will burn and erode as a result of the arcing which occurs as the loose connection makes contact at random points. On traction motors between 75 and 85 per cent of the total current passes through the brush shunts. If the shunts are removed, the current distributes itself approximately 50 per cent through the spring fingers and 50 per cent through the brush box. A design which would tend to increase the connection resistance will certainly result in pushing more current through the brush box. Since the brush box is a poor or loose connection it seems reasonable to expect that the box wear rate and brush side wear will increase because of arcing between the brush and the box.

The most efficient means of conducting the current to the brush working face is the best. At present, the tamped type connection used on traction motors does the most efficient job, and in the long run it is probably cheaper than other approaches which may eventually cause the replacement of items much more expensive than shunted brushes.

By K. R. MATZ
National Carbon Company

This is the fourth of a series of questions and answers which are appearing each month.



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Magnus R-S Journal Stops are now installed on more than 2,600 cars which have accumulated more than 30,000 car-months of service. In this time there have been only six road failures. That's equivalent to better than 6,000,000 car miles between set-outs. You can't beat that kind of performance with any other type of freight car bearing — or any other journal bearing device.

The Magnus aluminum alloy Journal Stop — a new development now being tested—may provide still greater savings to railroads. Use of this new aluminum alloy rather than bronze will cut Journal Stop costs approximately 25%—reducing average initial costs to $50 or less per car. For full information on our bronze and aluminum Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

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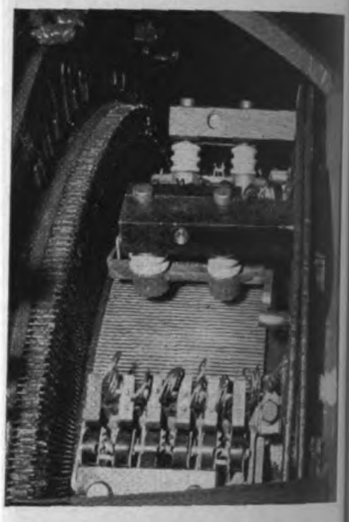

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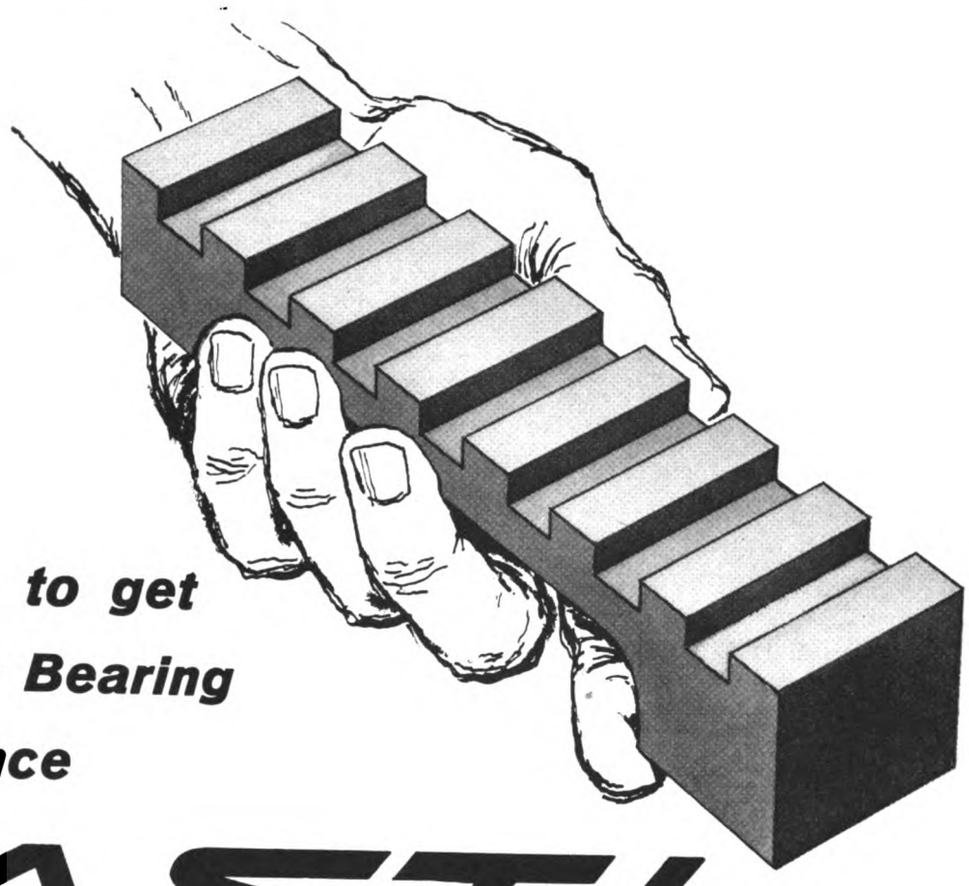

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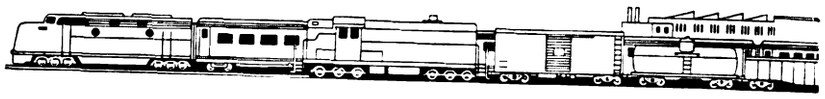
RAILWAY LOCOMOTIVES AND CARS

PROBLEM PAGE . . .



WHERE THE TOUGH ONES ARE HANDLED

A new question this month. Remember that it pays you to share your ideas and experiences with our readers. Submit letters to the Problem Page Editor.

What method has been most successful for cleaning covered hoppers in cement service to determine their light weight, and so that the doors and covers will operate properly? Are special tools necessary? Can car design changes be made in existing cars to simplify the process?

DO DIESELS START FIRES?

Can the responsibility for track-side fires ever be laid to diesel-electric locomotives?

(*Discussion continued from the December, 1956 issue*)

KEEP THEM CLEAN, *by T. J. Meade, Midwestern Area Service Supervisor, Fairbanks, Morse & Co. (At the 1956 meeting of the Railway Fuel and Traveling Engineers Association, during a discussion of diesel operating probelms, Mr. Meade answered the following question: What can be done to stop the accumulation of carbon in the exhaust manifold of a 1,000-hp Fairbanks-Morse switcher? When the engine is worked hard on a transfer job, it will throw out large pieces of hot carbon which often set the right-of-way on fire.*

Keep the exhaust manifold drains open and, secondly, clean the exhaust port areas at established periods. When I say established periods, I mean that we can't always follow the book on cleaning carbon. An engine in one application may accumulate carbon faster than it would in another application and in each individual case maintenance personnel has to more or less set up its carbon cleaning program to suit the situation as it exists. Carbon may not be a problem at all in some cases.

The main thing that will contribute to carbon accumulation is poor combustion, and anything that we can do to eliminate poor combustion will make it easier to be rid of the carbon. One of the first things we should be sure of is that our fuel injectors are in good shape. Injection and crank-shaft timing should be checked . . . because that, too, contributes to poor combustion.

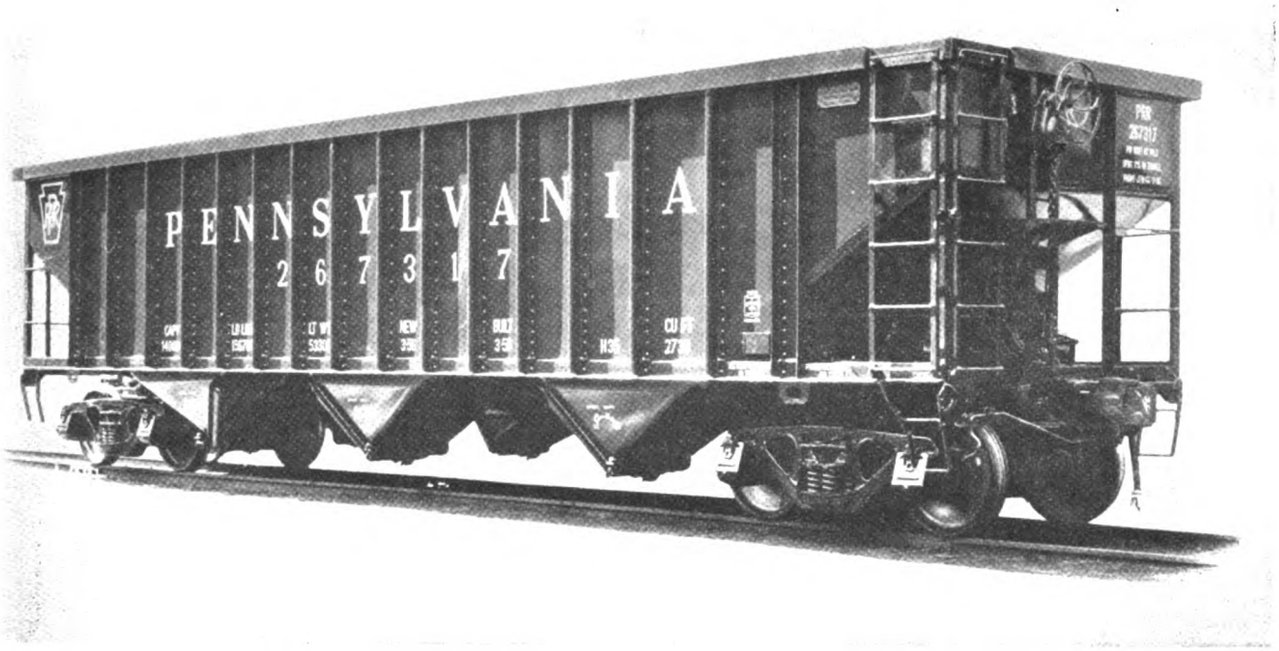
Another thing that might contribute would be dirt in the air receivers. Quite frequently air intake ports are neglected because they don't very often give trouble. They will accumulate dirt if the air filtration is not kept up to par, so they should be inspected occasionally. Engine air-intake filters should be inspected to make sure that they are not restricted. Engine temperature control should be maintained.

In the cleaning of the carbon, the fellows who scrape it off the area where it accumulates [may] leave it lie in the manifold. I personally have never liked that. Then they start the engine up and it will come out in gobs. I think that the loose carbon should be swept out of the exhaust manifold rather than try to blow it out the stack, because that also can start a fire.

OFFICIAL ACTION. *The following is a notice issued to trainmen and enginemen by one railroad showing steps to be taken in preventing their locomotives from starting fires.*—."We have experienced several instances of fires along the right-of-way attributed to deposits being ejected from exhaust stacks on diesel locomotives [and] alighting in dry grass shortly after the train departs from terminal and engine is being worked at full throttle.

"To eliminate this condition on diesel units that have been standing or idling for any length of time, please arrange immediately, if you are not already doing so, to run engines near or at full throttle position for a short period of time just prior to departing train yard in order to clear the exhaust system and stacks of any loose carbon or foreign matter that might have accumulated therein. This practice will eliminate the possibility of such deposits being ejected in critical areas while train is in motion.

"During the dry season when high temperature and low humidity prevail in many sections, engine crews and trainmen should be particularly alert to detect any evidence of excessive spark emission from diesel units and should indicate on Work Report specific unit numbers involved so that corrective action can be taken at maintenance terminals. Excessive spark emission involves ejection of sparks which remain incandescent for a period long enough to reach the ground, as compared to the occasional normal flurries of small particles that quickly extinguish themselves in the air as they rise from the exhaust stack."



"Pennsy" standardizes on high strength low alloy steels containing nickel for ALL new hopper cars

Pennsylvania Railroad recently received delivery of a fleet of new 70-ton hopper cars.

The high tensile steel plates which contact the lading are expected to last approximately 50% longer than the carbon steel sheets formerly used in hopper cars of this type.

To provide this increased life expectancy, the "Pennsy" is standardizing for all new open-top hopper cars, on the use of high strength low alloy steels containing nickel, for all body sheets which contact the lading.

This policy provides extra strength, wear- and corrosion-resistance without adding to weight. As far as maintenance costs are concerned, the use of high strength low alloy steels permits the "Pennsy" to cut heavy repair work and "out-of-service" time in half.

High strength low alloy steels are ideal for railroad freight car bodies

They provide:

(1) Yield strength of 50,000 psi minimum in the as-rolled condition, which permits either:

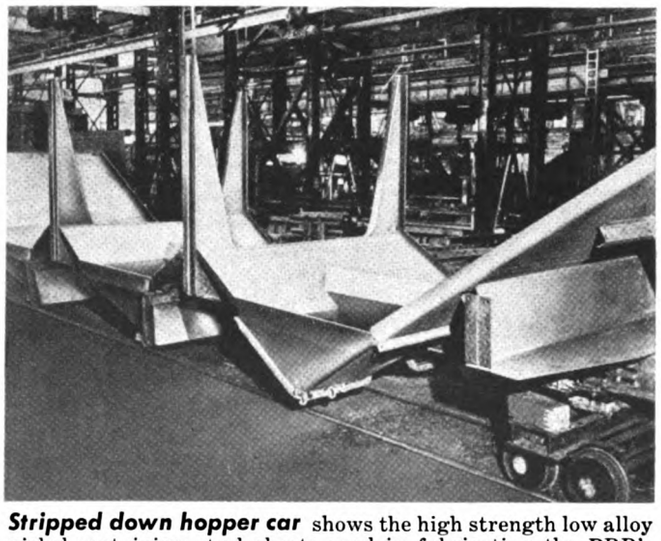
(a) appreciable weight reduction by using thinner sections . . . or

(b) if the same sections are used as for carbon steel, much better durability and minimum maintenance.

(2) Excellent response to usual fabrication operations . . . easy forming . . . easy welding.

(3) Good resistance to corrosion, abrasion and impact.

Send for "Nickel-Copper High Strength Low Alloy Steels." A copy is yours for the asking.



Stripped down hopper car shows the high strength low alloy nickel-containing steel sheets used in fabricating the PRR's new triple-hopper type cars. The use of high strength low alloy steels is expected to lengthen car life, reduce maintenance costs and provide greater equipment availability.

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

PRINTED IN U.S.A.

QUESTIONS and ANSWERS

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Manipulating Dynamic Brake on Grades

F555-Q—What performance may be expected of the dynamic brake on heavier grades?
A—On heavier grades the dynamic brake may be insufficient to hold the train.

F556-Q—How is the train speed affected in this case?
A—The train speed will increase and the ammeter pointer will tend to move into the red area.

F557-Q—What must be done as above action takes place?
A—Keep moving the handle back to hold the pointer in the white area.

F558-Q—What action should be taken when the train speed reaches the maximum authorized?
A—When this happens, make an air brake application to check the train.

F559-Q—Should the handle position be changed when the brake application is made?
A—No.

F560-Q—What can be done after reducing the speed?
A—Release the air and allow the dynamic brake to hold the train while the brake pipe is being recharged.

F561-Q—How does the ammeter pointer perform during the speed changes?
A—When the air brakes apply, the pointer will drop back. After release of the air, train will again gain speed, assuming grade conditions are the same. This will bring the ammeter pointer up again.

F562-Q—What should the operation be when the pointer nears the limit of the white zone?
A—The speed will again be at the desired limit and another brake application should be made.

F563-Q—What will be the result of this method of handling?
A—A nearly constant speed will be maintained if light air applications are made which will reduce the speed very slightly.

F564-Q—Does the movement of the ammeter pointer coincide with the indications as shown on the speedometer?
A—No. Actually, the effect of a light air application will first show as a movement of of the ammeter pointer before it is noticeable on the speedometer as a drop in locomotive speed.

F565-Q—Under what condition will the speedometer remain practically steady?
A—When the air is released as soon as the ammeter begins to fall back.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G619-Q—What happens when the wheel slipping has stopped?
A—The locomotive will automatically re-apply power after the slipping has stopped.

G620-Q—What must be done under extremely poor rail conditions?
A—Repeated slipping should be anticipated and sand applied to prevent it.

Indication of a Pair of Wheels Sliding

G621-Q—When starting a train, what is the indication of a pair of wheels sliding?
A—The wheel slip light will flash on and off intermittently.

G622-Q—What happens as train speed increases?
Manual 2310, Page 227.
A—As the train speed increases, the light will stay on more or less continuously.

G623-Q—Will the light go out when the throttle is reduced?
A—No.

G624-Q—What takes place when the throttle is closed to idle?
A—The light goes out.

G625-Q—If this happens what action should be taken by the engine crew?
A—The engine crew should make an immediate investigation to determine the cause.

G626-Q—What may be the cause for wheel sliding?
A—The wheels may be sliding due to a locked brake, a broken gear tooth wedged between the pinion and ring gear, etc.

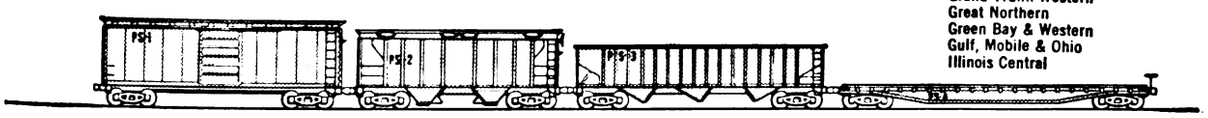
G627-Q—What may be an indication of serious traction motor trouble?
A—Repeated ground relay action, accompanied with unusual noises such as continuous thumping or squealing.

G628-Q—What precaution should be observed in case of repeated wheel slip or ground relay action?
A—Under no conditions should a power plant be isolated and allowed to remain in the consist unless it is certain that all wheels are rotating freely.

Trouble Shooting
Manual 2310, Pages 501 to 512 incl.
Necessary Items To Make Locomotive Operate
(from operating cab).

G629-Q—Name an essential item required in order to have the locomotive operate.
A—The "PCS OPEN" light must *not* be burning.

PS-1
PS-2
PS-3
PS-4



PS-1 box car, **PS-2** covered hopper, **PS-3** open hopper, **PS-4** flat car

standardized freight cars

from the experience of the world's largest carbuilder

Pullman-Standard answered all freight car buying questions about service-life, maintenance expectation and shipper-consignee acceptance when it designed, built, tested and then offered the first standardized box car, the PS-1, eleven years ago. Standardization means pre-engineered and tested cars built with the long-run economies and benefits of modern mass production techniques impossible for limited quantity cars. And standardization means thorough, continuous quality proving through exhaustive testing in laboratory and in service.

Recognizing transportation needs for bulk material handling cars, Pullman-Standard worked with railroad users to develop the standardized PS-2 Covered Hopper and PS-3 Open Top Hopper Cars. And Pullman-Standard has recently added the PS-4 all-purpose Flat Car to its standardized line.

The PS-3 Open Top Hopper is all-welded and designed to withstand corrosion and the hard service usages to which hoppers are traditionally put. Built and tested for structural strength, this car allows fast, clean unloading through design and fabrication features.

Railroad management will benefit from investigating the advantages of adding Pullman-Standard Standardized Freight Cars to rolling stock fleets.

For literature and complete details, just call or write the nearest Pullman-Standard Car Manufacturing Company office.

WORLD'S LARGEST MANUFACTURER OF FREIGHT AND PASSENGER CARS

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CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

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Canadian National
Canadian Pacific
Central Soya
Central of Georgia
Central R. R. of New Jersey
Chesapeake & Ohio
Chicago, Burlington & Quincy
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Chicago & North Western
Chicago Great Western
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Chgo., Rock Island & Pacific
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Delaware & Hudson
Delaware, Lackawanna & West'n
Denver & Rio Grande Western
Detroit, Toledo & Ironton
Duluth, Messabi & Iron Range
Duluth, So. Shore & Atlantic
Elgin, Joliet & Eastern
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Ferrocarril Del Pacifico
Florida East Coast
Ft. Dodge, Des Moines & South'n
General American Trans.
Georgia Railroad
Western Railway of Alabama
Grand Trunk Western
Great Northern
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Louisville & Nashville
Maine Central
Minn'pls, Northfield & South'n
Minneapolis & St. Louis
Mississippi Central
Missouri-Kansas-Texas
Monon
National Sugar Refining
Nashville, Charleston & St. Louis
New Haven
New York Central
N. Y., Susquehanna & Western
Nickel Plate
Norfolk & Western
North American Car Co.
Northern Pacific
Oliver Mining Co.
Pennsylvania
Phila. Qtz. of Cal.
Pittsburgh & West Virginia
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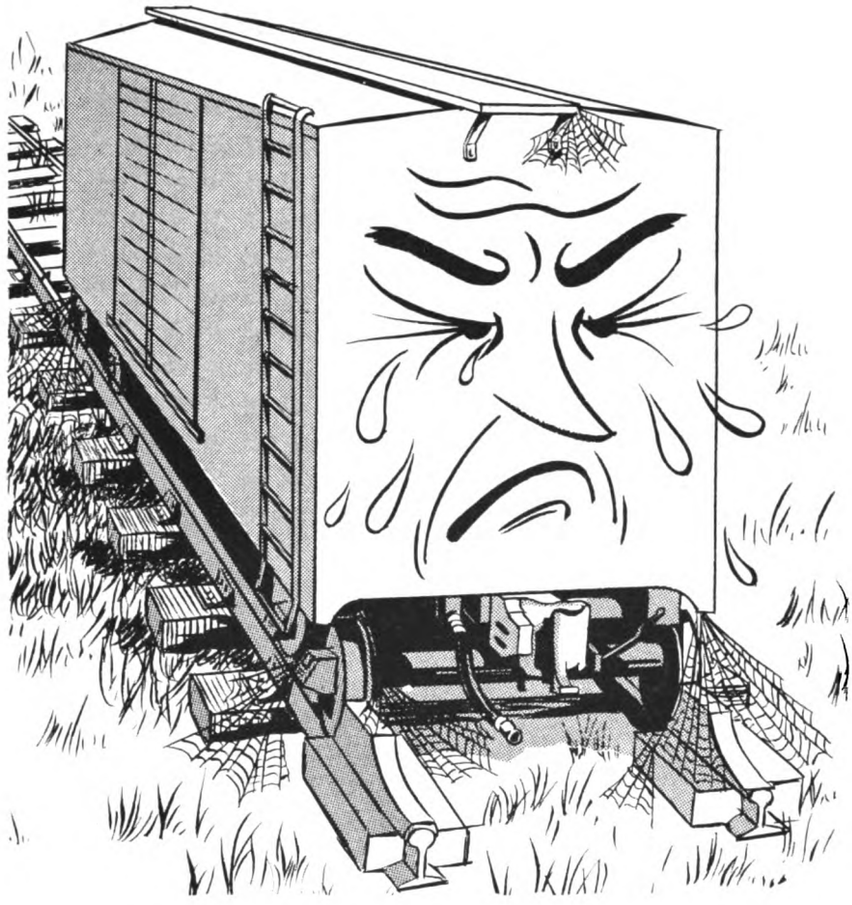
St. Louis-San Francisco
St. Louis Southwestern
Savannah & Atlanta
Seaboard Air Line
Southern Pacific
Southern Railway
Tennessee Central
Texas-Mexican
Toledo, Peoria & Western
Union Pacific
Union Railroad
U. S. Army
U. S. Navy
U. S. Trans. Corps
U. S. War Department
Virginian
Wabash
Western Maryland
Western Pacific



DON'T SIDETRACK OLD BOX-CARS!

NEW, ECONOMICAL METHOD FOR PROFIT UP-GRADING!

Frequently, after only a short time in service, box-cars are found to be unsuitable for high revenue shipments of grain or meat because of accumulations of fertilizers, oil, soda ash, tar, rancid grain and like residues of past shipments.

Now, however, there's an easy, Economical, PROFITABLE ANSWER . . .

MAGNUS SUPERSIL PR

A solution of Magnus Supersil PR, in water, and applied by one of the new upgraders—or even an ordinary steam gun—does an unsurpassed job of cleaning box-car interiors of even such difficult materials as lamp black or fertilizers. And, it leaves a pleasant odor as well.

Why not ready your box-cars—new or old—for main-line profit?! For full information on this modern Magnus method of upgrading, write to MAGNUS, 77 South Avenue, Garwood, New Jersey.

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RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
—a world-wide organization specializing in cleaning and protection of all surfaces.

PERSONAL MENTION

EJ&E *(Continued from page 14)*

Joliet, Ill.

G. F. Bachman

G. F. BACHMAN, formerly assistant general superintendent of motive power and equipment, Lackawanna, appointed chief mechanical officer. *Born*: January 14, 1916, at Cedar Rapids, Iowa. *Education*: University of Illinois 1939 (BS in Railway Mechanical Engineering). *Career*: Began as special apprentice in 1937 on the Chicago, Rock Island & Pacific. Became assistant diesel supervisor on the Lackawanna in 1941, subsequently serving as enginehouse foreman, diesel supervisor, master mechanic, superintendent diesel maintenance, and assistant general superintendent motive power and equipment.

W. R. WARE appointed assistant to chief mechanical officer.

C. G. MAHONEY, appointed superintendent of motive power, with jurisdiction over locomotive department. Formerly master mechanic at Gary, Ind.

Pennsylvania

Philadelphia, Pa.

JACOB STAIR, JR., electrical engineer, retired.

JOHN W. HORINE, JR., superintendent of locomotive equipment, appointed electrical engineer.

CARL A. KORN, appointed superintendent of locomotive equipment, system. Formerly master mechanic at Williamsport, Pa.

JOHN M. MCGUIGAN, master mechanic at Baltimore, appointed master mechanic at Williamsport, Pa.

Virginian

Princeton, W. Va.

J. C. FOX, electrical engineer, retired.

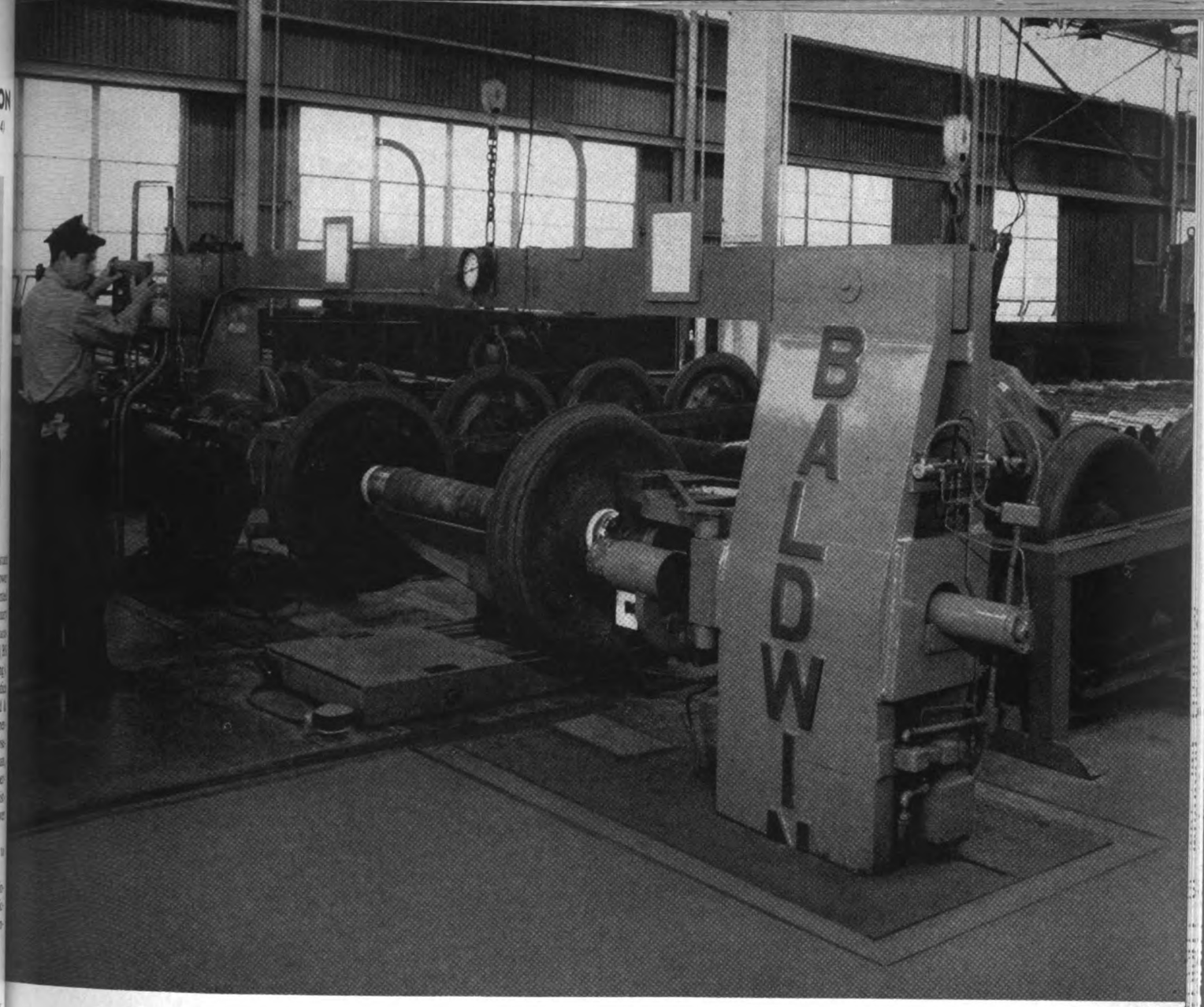
E. H. WERNER, assistant electrical engineer, appointed electrical engineer.

Obituary

GEORGE D. MINTER, retired division car inspector of the Norfolk & Western at Portsmouth, Ohio, died on March 26.

FRANK V. SHERMAN, master mechanic of the Louisville & Nashville at Sibert, Ala., died March 11.

FRANK A. SHOULTY, who retired as superintendent of the car department of the Chicago, Milwaukee, St. Paul & Pacific at Milwaukee, in 1954, died on March 31.



Baldwin wheel press assembles wheel sets in as little as 2 minutes

Baldwin and Niles railroad tools are cutting shop costs drastically in the nation's leading railroads. The wheel press pictured above, recently installed in Seaboard Air Line's new shop at Hamlet, N.C., can assemble wheel sets in as little as 2 minutes. Axles and wheels are supplied by gravity racks to the press, which can be fed by one man. One assembly man and a press operator are all the manpower required to process the sets.

The Baldwin wheel press also eliminates substantial installation costs. Due to the fact that the carriage has its own built-in elevator, the machine can be accommodated by a pit only 6 in. below the floor line—in contrast with pits 6 or more ft. deep required for conventional equipment. Other efficient B-L-H railroad machine tools in operation at Seaboard's Hamlet shop include a new Niles wheel borer with sidehead, a Niles wheel lathe, and a specially designed Niles axle turning and burnishing lathe.

Write today for detailed information on B-L-H railroad machine tools.

Hamilton Division Hamilton, Ohio

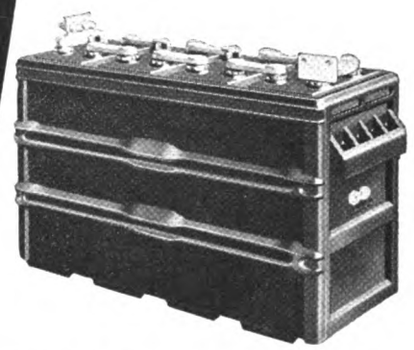
BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

BALDWIN BLH LIMA-HAMILTON

Use C & D Slyver-Clad* batteries in your equipment. Why? Because C & D batteries meet all the requirements for rugged railroad service. Each powerful, heavy-duty positive plate has five separate layers of insulation. Because of this famous method of insulation and retention "shedding" is no longer a determining factor in battery life. Thus with C & D batteries you get longer life, higher capacity!

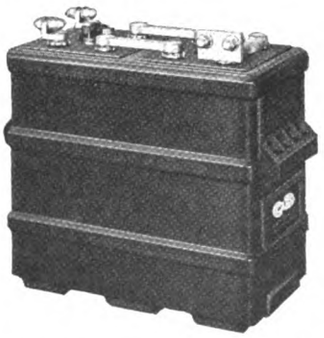
*T.M. Reg.



C & D Diesel starting batteries give:

1. High sustained voltage
2. Reduced maintenance requirements
3. Reduced connection loss

For complete details, write for Bulletin DL-576



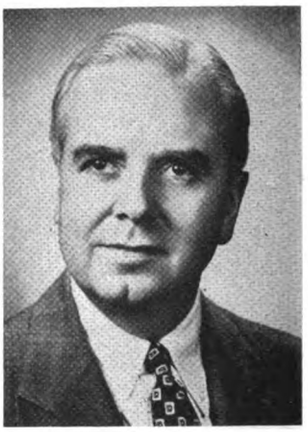
C & D Carlighting and Air Conditioning batteries give:

1. Lowest annual cost
2. Steady uniform voltage
3. Reduced maintenance requirements

For complete details, write for Bulletin AC-546

C&D BATTERIES, INC.
of Conshohocken, Pa.
Industrial Batteries Since 1906
Sales and Service Offices in Principal Cities from Coast to Coast

Supply Trade Notes . . .



D. C. Salisbury

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—*Duane C. Salisbury*, former vice-president and general sales manager, Detroit Colortype Company, has joined Simmons-Boardman as vice-president. Mr. Salisbury, who will be director of sales for the railway division, including Railway Locomotives and Cars, has been active in sales management in the publishing and graphic arts fields for 20 years. While with Colortype, he was sales counsel to the VanderKloot Associated Companies. From 1943 to 1948 he headed advertising sales for the McGraw-Hill Publishing Company's transportation magazine. He was president and general manager of the Carter Company, Detroit, from 1948 to 1955, when he became associated with the Colortype Company.

■

C & D BATTERIES, INC.—*Patrick J. Biggan*, a former master mechanic on the Rock Island, who has been engaged in railway supply sales in San Antonio, Texas, since 1952, has formed a company known as *P. J. Biggan & Associates*, representing *C & D Batteries, Inc.*, in Texas, Louisiana and Arkansas.

■

EQUIPMENT RESEARCH CORPORATION.—*J. E. Shaffer*, president of Seaboard Railway Equipment Company, has been appointed sales agent to eastern railroads for Equipment Research of Chicago.

■

GRAHAM-WHITE SALES CORPORATION.—*D. Alcott Kelly* and associates, who through the *Prime Manufacturing Company*, have distributed and serviced products of *Graham-White Manufacturing Company* in the railroad field only, have organized the Graham-White Sales Corporation for the exclusive sales, distribution and service of all products of the company in the railroad and other fields.

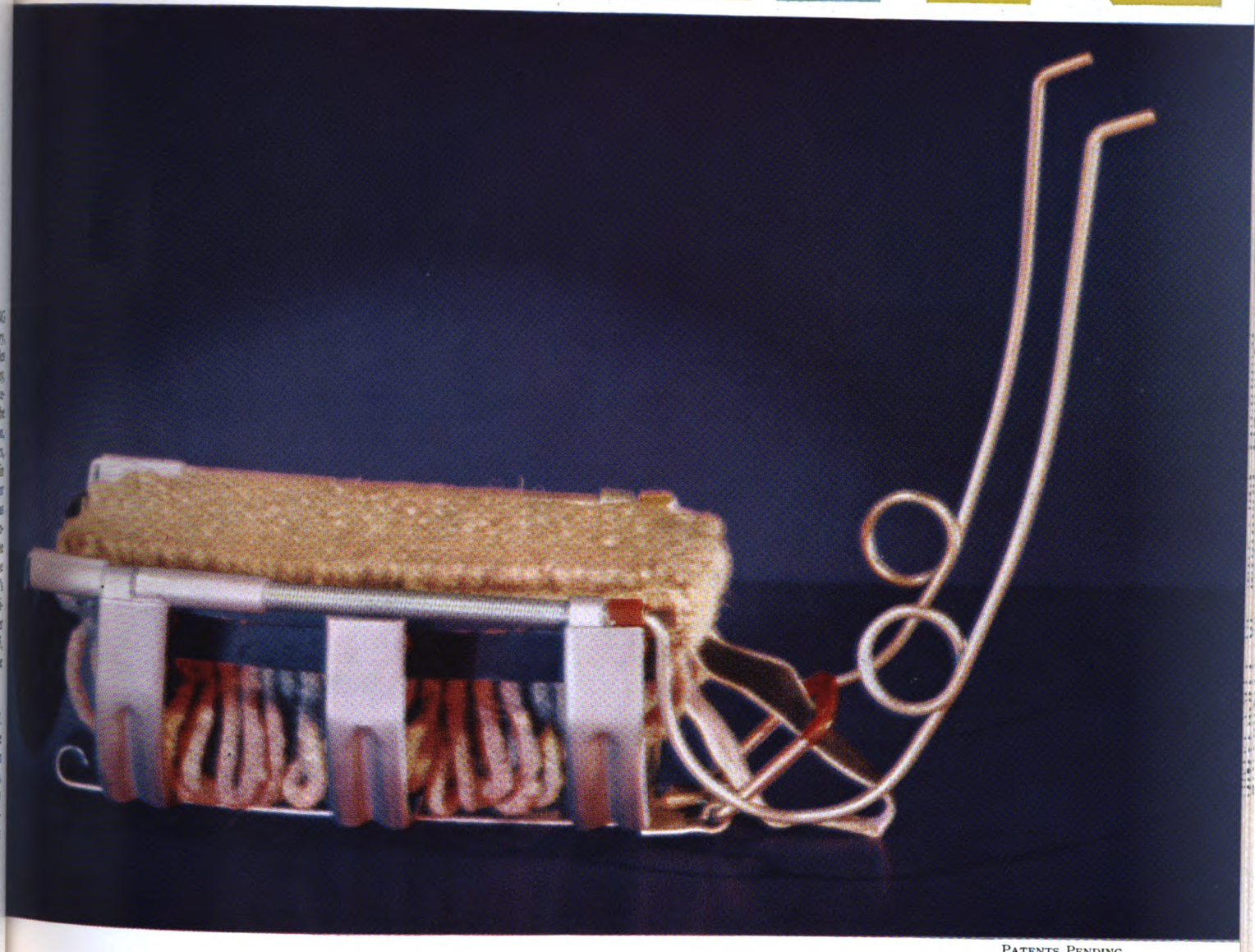
■

AMERICAN STEEL FOUNDRIES.—The following members of the Transportation Equipment Division sales depart-

(*Continued on page 68*)

THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

ROLIN



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

THE rolin CORPORATION

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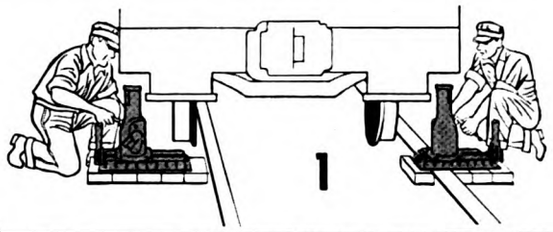
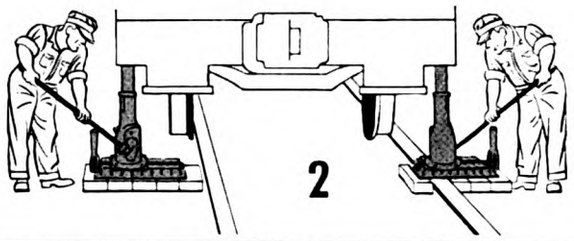
How to get back on the track quickly

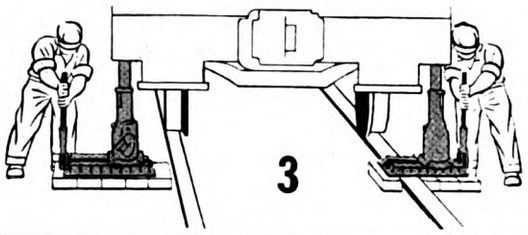
Without A Crane!



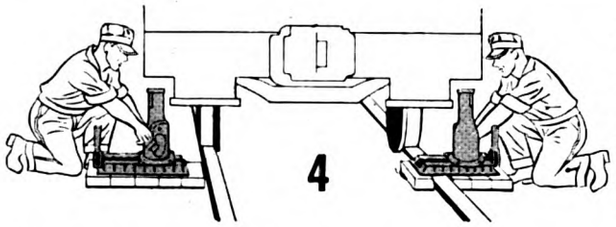
Place a *Duff-Norton traversing base* and *jack* beside each derailed truck.



Jack up the car or locomotive until wheels clear top of rails.

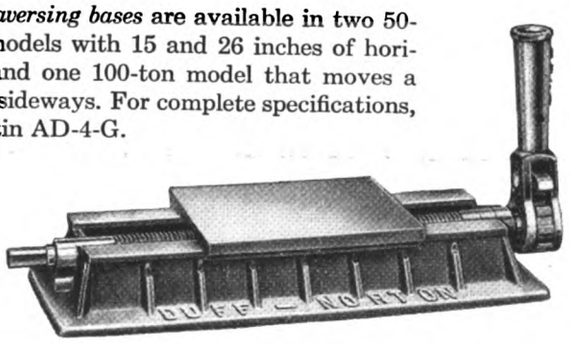


Move jacks horizontally simultaneously on traversing bases until wheels are in alignment with rails.



Lower wheels; you are back on the track, quickly, inexpensively and without danger of distorting car or locomotive frame.

Duff-Norton traversing bases are available in two 50-ton capacity models with 15 and 26 inches of horizontal travel and one 100-ton model that moves a load 20 inches sideways. For complete specifications, write for bulletin AD-4-G.



Duff-Norton Jacks

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

SUPPLY TRADE NOTES

(*Continued from page 66*)

ment of *American Steel Foundries* have retired: *W. S. Spieth, Sr.*, district sales manager, Chicago and *J. T. Rowbottom*, district sales manager, New York.

■

J. A. Mustard, Jr.

C. A. Taylor

W. F. Hunt

THOMAS A. EDISON INDUSTRIES, McGRAW-EDISON COMPANY.—*James A. Mustard, Jr.*, has been appointed to the newly created post of regional sales manager, with headquarters in Chicago. Mr. Mustard will supervise the Chicago and St. Louis district offices. *Charles A. Taylor*, has been appointed manager of the Washington, D. C., district office, and *William F. Hunt*, succeeds Mr. Taylor as manager of the Pittsburgh office.

(*Continued on page 70*)

Why worry about Batteries...

Specify **gould** and relax

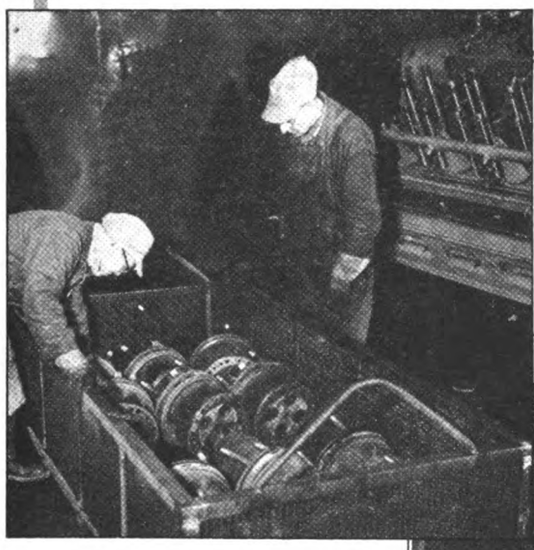
America's Finest!
GOULD KATHANODE
BATTERIES
for Air Conditioning
and Car Lighting

Dependable battery performance day in, day out is worth more to you than any other single benefit. Right? That's why Gould has carefully perfected the design of Gould Batteries over long test years. Manufacturing techniques at Gould are also the result of patient development, so that today you are assured of maximum power, long life, and trouble-free operation with *every* Gould battery you buy. Ask for new booklet "...so you're going to buy an industrial battery." Write Gould-National Batteries, Inc., Trenton 7, N.J.

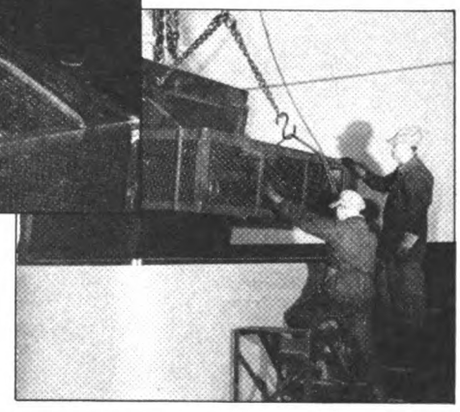
©1957 Gould-National Batteries, Inc.

Always Use Gould-National Automobile and Truck Batteries *More Power to you from Gould*

Tough Parts Cleaned Faster in LIX



Workman inspecting Diesel cylinder heads after cleaning with Lix Diesel Klean Heavy.



The Wabash Shops at Decatur, Illinois, get fast, thorough cleaning of diesel engine parts with Lix Diesel Klean Heavy.

WHY NOT LET LIX HELP YOU WITH YOUR TOUGH CLEANING JOBS?

All working parts of Diesel Locomotives, such as Pistons, Liners, Bearings, Lube Oil Coolers, etc., that are sometimes real problems, are cleaned faster and more thoroughly with Lix. Time and hard labor is reduced to a minimum.

No brushing or scraping is necessary. Just soak the parts in Lix and rinse with water or mineral spirits. It is harmless to all types of metals during their cleaning cycle.

A Lix representative will be glad to demonstrate in your shop how he can save you time and money.

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

Write, Wire or Phone today for free demonstration in your shop.

THE Lix CORPORATION (OF MISSOURI)

PRODUCTS OF RESEARCH

716 EAST 85th STREET, Dept. RL-12
KANSAS CITY, MISSOURI

"Leadership in Industrial Cleaning"

SUPPLY TRADE NOTES

(*Continued from page 68*)

A. J. McMullen

GARLOCK PACKING COMPANY.—*Albert J. McMullen* has been elected a vice-president at Palmyra, N. Y.

■

TIMKEN ROLLER BEARING COMPANY.—The Buffalo, N. Y., Industrial and Steel Sales office, is being moved from 374 Delaware avenue, to a new building being completed at 2960 Main street.

■

UNITED STATES RUBBER COMPANY.—*Carroll C. Parker* has been appointed grinding wheels sales manager for the mechanical goods division, succeeding *J. A. Fairfield,* retired. *William J. Reddington* has been appointed St. Louis district sales manager for the same division, succeeding *Hugh Reynolds,* retired.

■

UNION CARBIDE CORPORATION.—The name of the *Union Carbide & Carbon Corp.* has been shortened to the Union Carbide Corporation.

LINDE COMPANY.—The name of the *Linde Air Products Company,* a division of Union Carbide, has been shortened to the Linde Company.

■

GRIFFIN WHEEL COMPANY.—The new Griffin wheel plant at Colton, Calif., has been completed and placed in operation. The plant has a capacity of 120,000 wheels per year.

■

ENTERPRISE RAILWAY EQUIPMENT COMPANY.—*W. K. Farmer* has been appointed mechanical engineer. Mr. Farmer formerly was chief mechanical engineer of the Chicago & North Western.

■

NATIONAL ALUMINATE CORPORATION.—*Dr. J. W. Ryznar* has been appointed technical director in charge of general research and development.

■

NATIONAL LEAD COMPANY, MAGNUS METAL DIVISION.—*E. M. Van Winkle,* president of the Magnus Metal Corporation, a subsidiary of National Lead, has assumed also duties as general manager of the Magnus Metal Division,

(*Continued on page 72*)

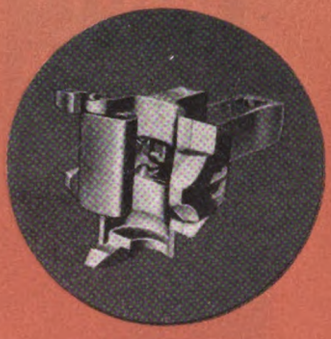
There's Improved Railroading with

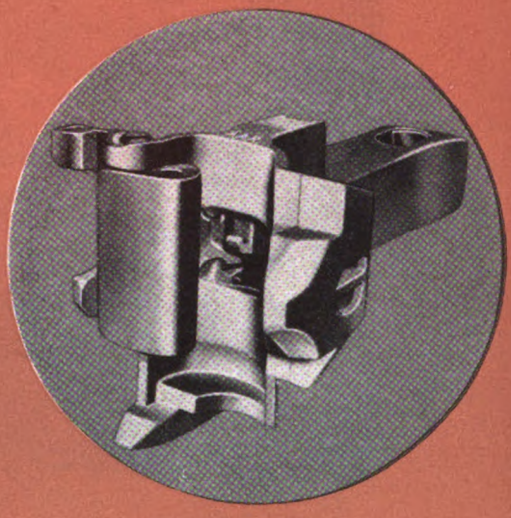
National Specialties

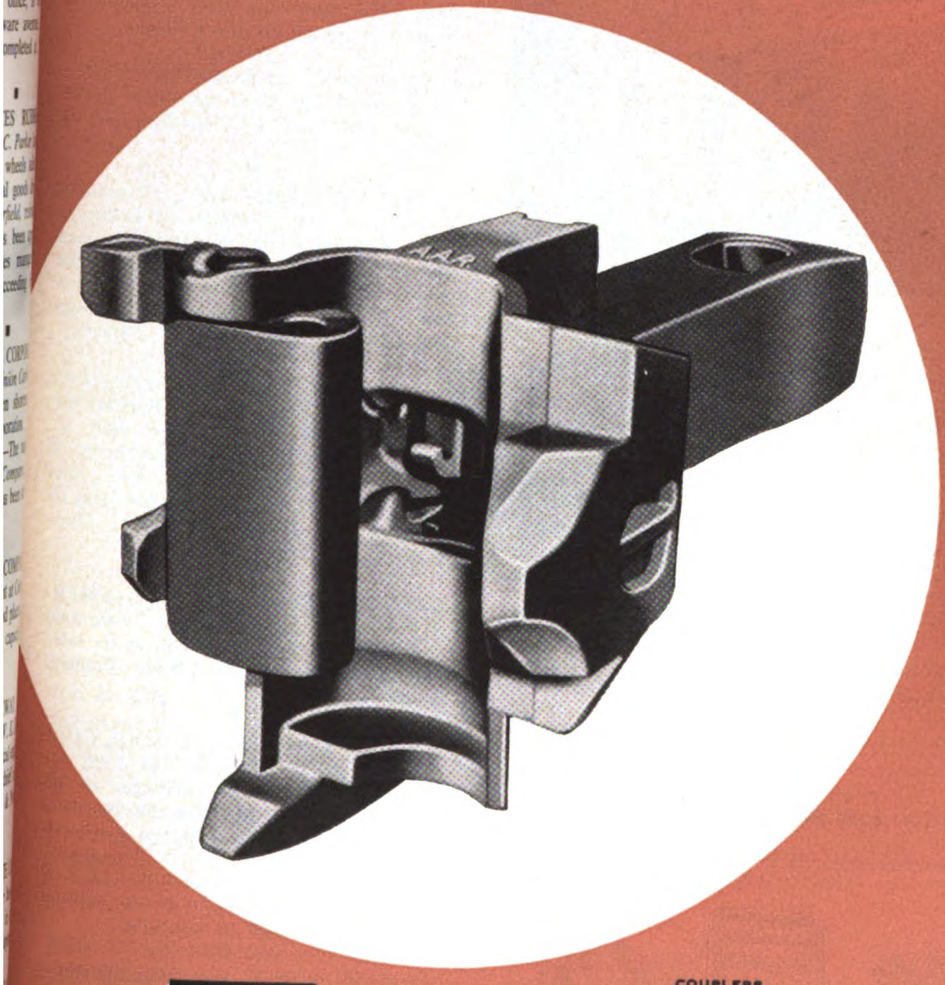
Example:

type F couplers

for freight service







The Type F coupler was developed for freight service after the proven ability of the highly successful Type H Tightlock coupler in passenger service. 22 per cent stronger than the Type E and with interlocking wings for alignment, the Type F is proving its many advantages in service today. The free slack between knuckles has been reduced to about 50 per cent of that in the E coupler. Another safety factor is the centrally located shelf on the lower front face which serves to support a conventional type coupler in event of a pull-out.

AA-5271

GEARED TO PROGRESS
P R I
MEMBER

COUPLERS
YOKES
DRAFT GEARS
FREIGHT TRUCKS
JOURNAL BOXES

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868

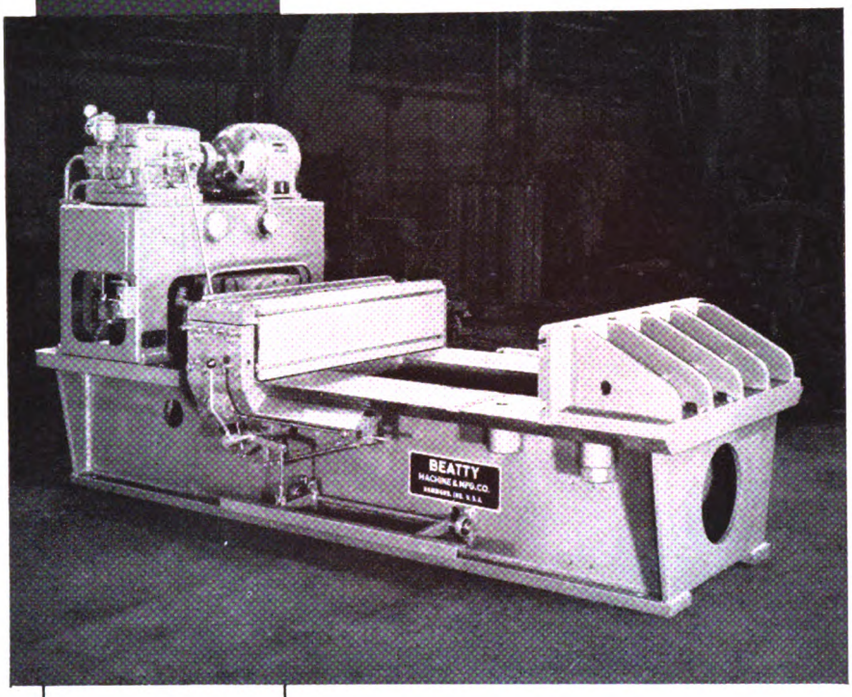
Railway Division Headquarters
Cleveland 6, Ohio

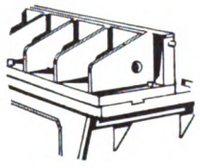
International Division Headquarters
Cleveland 6, Ohio

Canadian Subsidiary
National Malleable & Steel Castings Company of Canada, Ltd.
Toronto 1, Ontario

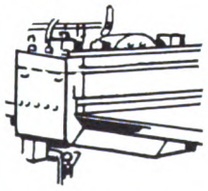
BEATTY HORIZONTAL HYDRAULIC BULLDOZER

RAPID PRODUCTION & RETURN SPEEDS BOOST OUTPUT





Resistance-bolster is keyed and bolted to table for die space change or use of special bolsters.



Ram guides are mounted in Vs beneath table surface.

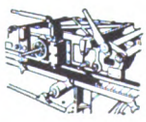
Featuring rapid production and return speeds: advance — 262″ per min.; press — 29″ per min.; return — 385″ per min. . . . this 200-ton Beatty press offers you more dependable, accurate production per man-hour. A compact, self-contained unit, it is very highly regarded for heavy metal working — forming, bending and straightening.

The machine is constructed of rolled steel plate, with a single-acting type main cylinder of high grade forged steel, bronze-bushed and recessed for chevron type packing. Your choice of foot or hand lever controls.

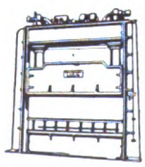
Write For Full Details

BEATTY
MACHINE & MFG. CO.

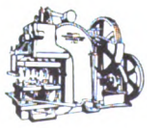
962 150th St.
HAMMOND, IND.



Spacing Table



Vertical Bulldozer



Heavy Duty Punch

SUPPLY TRADE NOTES

(*Continued from page 70*)

succeeding *John P. Borda,* retired. Other Magnus appointments include *John A. Mardick,* production manager; *G. C. Merritt,* assistant production manager, and *G. J. Coogan,* assistant production manager, in charge of all plant equipment.

HENRY MILLER SPRING & MANUFACTURING CO.—*I. M. Chambers* has been appointed manager of product design and development.

■

OCTAGON PROCESS, INC.—Octagon has appointed the *Metalclean Equipment Company* 177 Stoneway Lane, Bala-Cynwyd, Pa., as its distributor in the Philadelphia-Camden area, Pennsylvania west to Harrisburg, Delaware and Maryland.

■

PULLMAN COMPANY. — *James E. Flannery,* general superintendent of shops, has been appointed chief mechanical officer, Chicago, succeeding *Harry B. Reed,* retired. *James R. Mathews,* assistant general superintendent of shops, has been appointed assistant to chief mechanical officer, Chicago.

■

FAIRBANKS, MORSE & COMPANY.—*R. K. Annis* has been appointed development engineer, with headquarters in Chicago.

■

ACF INDUSTRIES INC., AMERICAN CAR & FOUNDRY DIVISION.—*Charles F. Venrick,* district sales manager, has been appointed vice-president, sales, western region, with jurisdiction over division sales offices in St. Louis, San Francisco and Chicago. Headquarters, Chicago.

■

ADANAC SUPPLIES LIMITED; CANADIAN WAUGH EQUIPMENT COMPANY.—*R. L. Lineker,* until recently manager, railway department, of Warnock-Hersey Company, Ltd., has been appointed assistant vice-president of Adanac and Canadian Waugh, Montreal.

■

SERVO CORPORATION OF AMERICA.—Servo has appointed *Instrument Associates,* Arlington, Mass., as its sales representative in the New England states.

■

CHICAGO PNEUMATIC TOOL COMPANY.—*E. S. Rosselle* has been appointed assistant sales manager of the railroad division. Mr. Rosselle has been transferred from the Chicago district to Philadelphia, where he will supervise railroad sales in the eastern district. *J. R. Ludwig* has been added to the railroad division sales staff at Chicago.

■

MOTOR WHEEL CORPORATION.—Motor Wheel, through its national railway sales representative *TZ Railway Equipment Company,* is now the exclusive distributor of Flexo-4 malleable iron journal box lids. Distribution rights were

(*Continued on page 74*)

NEW ESSOLUBE HD KEEPS ENGINES CLEANER LONGER... INCREASES POWER, REDUCES WEAR

New Essolube HD is a superior lubricating oil developed for gasoline and diesel engines of the types used in maintenance-of-way equipment. New Essolube HD contains one of the most effective detergent inhibitor additives ever used. It offers new low-temperature detergency *and* improved high-temperature detergency, plus improved oxidation stability and bearing corrosion resistance.

In extensive laboratory and field tests prior to its introduction, new Essolube HD *proved* its superior detergency properties. Under low-temperature conditions, Essolube HD markedly reduced sludge deposits. Under high-temperature conditions, piston varnish and top ring deposits were reduced to a new low. Such outstanding engine cleanliness results in *greater engine power, reduced wear, longer life.*

NEW ESSOLUBE HD is a versatile oil. You will save on inventory and handling by using it in all your maintenance-of-way equipment – both diesel and gasoline. But most important... there's no danger of using the *wrong* lubricant by mistake.

If you would like more specifics on new Essolube HD, call your local Esso office or write to Esso Standard Oil Company, Railroad Sales Div., 15 West 51st St., New York 19, N. Y.

Esso

RAILROAD PRODUCTS

SUPPLY TRADE NOTES

(*Continued from page 72*)

acquired from *National Malleable & Steel Castings Company,* giving Motor Wheel a complete line of journal box lids.

■

SAFETY FIRST SHOE COMPANY.—*Lou Kreamer,* district manager has been appointed manager of the railroad sales division, with office at Holliston, Mass.

■

FLANNERY MANUFACTURING COMPANY; FORT PITT MANUFACTURING COMPANY.—*Robert N. Scott* has been elected executive vice-president. Mr. Scott was previously vice-president and director of sales.

■

CLEVELAND CRANE & ENGINEERING CO.—*John G. Frischkorn,* district sales manager for Cleveland Tramrail Division of Cleveland Crane, has been named assistant sales manager at Wickliffe, Ohio.

■

TURCO PRODUCTS, INC.—*Carl. F. Graham* has been appointed director of research and development.

■

JOHN A. ROEBLING'S SONS CORPORATION.—*Earl A. Frazier,* Cleveland district sales manager has been appointed New York district sales manager for the wire rope and aircord division.

S. V. Malin

GOULD - NATIONAL BATTERIES INC.—*S. V. Malin* has been appointed district manager in Detroit.

■

ALCO PRODUCTS, INC.—The Pittsburgh district office has been moved to Greentree and Cochran Roads in the suburban South Hills section of Scott Township, five miles from Pittsburgh.

■

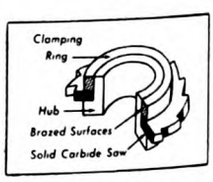
THOR POWER TOOL COMPANY.—The Houston, Tex., office has been moved from 7241 Harrisburg boulevard to 5503 Lawndale avenue.

Obituary

WILLIAM D. HICKEY, 69, retired vice-president of the Magnus Metal Corporation, died April 11.

Now! CLEANER, FASTER COMMUTATOR UNDERCUTTING *with the* GAY-LEE SOLID CARBIDE SAW

These undercutting saws, universally used by diesel engine manufacturers and many railroads, are the logical choice for your own maintenance shops. Gay-Lee's patented "One-Unit Design" combines the higher speeds and longer life of a carbide blade with a strong, rigid steel hub for perfect alignment. The solid carbide blade and steel hub are brazed into a one-piece unbreakable unit that will not part during use or re-grinding. Available in "U" or "V" type.



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Send diameter, arbor size and thickness desired for quotation.

GAY-LEE COMPANY
CLAWSON • MICHIGAN

ANTIQUE . . . OR MODERN . . . ?

In furniture, some still prefer antiques. But in railroads, the trend is definitely toward modern. Sure sign of an up-to-date, progressive railroad—freight cars equipped with NAILABLE STEEL FLOORING.

The rugged strength of N-S-F* stands up under the heaviest loads and loading equipment, yet shows no strain—won't gap or splinter. In fact, N-S-F actually strengthens critical points of the underframe, can outlast the car itself. And don't forget, its skidproof surface provides easier loading, greater safety for personnel.

You'll profit in going modern and specifying N-S-F.

*N-S-F (TM): NAILABLE STEEL FLOORING

Made and sold by

STRAN-STEEL CORPORATION

Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION

Complete engineering and cost data available from our representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal. 57-SS-20A

cut
tool costs
with

Snap-on*

BLACK FINISH
RAILROAD WRENCHES

Here they are . . . "*Snap-on* Tools dressed in overalls" . . . made to give years of hard service on the toughest jobs you have. Nothing's missing but the expensive chromium finish — in every other respect they're 100% *Snap-on* quality . . . the finest tools that can be built. They're identical with other *Snap-on* tools until they reach the finishing processes. Skipping this operation gives you welcome savings.

Now available in a wide range of socket wrenches and handles, both ½" and ¾" drives. Also in open-end wrenches, long and short combination wrenches, and pliers. *Snap-on's* Railroad Division will be glad to supply complete literature on standard and special railroad tools. Write today.

SNAP-ON TOOLS CORPORATION
Railroad Division
8130-F 28th Avenue • Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation.

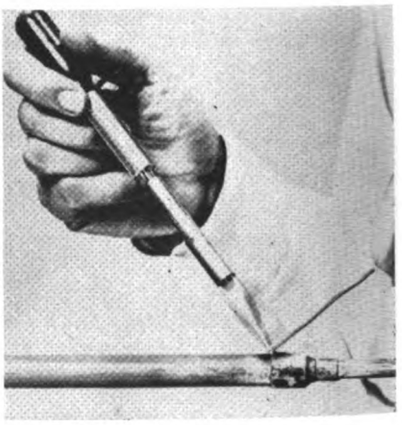
EQUIPMENT

(*Continued from page 11*)

Oil Absorbent Damp-proofing

Dri-Z-All, an oil and grease absorbent, is available in one lb and 25 lb bags. It is said to be non-caustic, as well as a non-combustible, granular compound. To remove hard-packed grime, the material is sprinkled on, rubbed in with a stiff broom, and then swept up in the usual manner.

Tests have indicated it to be more than adequately free from the possibility of spontaneous combustion. The compound is also recommended by the manufacturer for general damp-proofing and the control of odors, particularly where great quantities of perishable foodstuffs or chemicals are handled. *Diamond Head Oil Refining Company, Dept RLC, 1401 Harrison Tpk., Kearny, N. J.*



Miniature Blow Torch

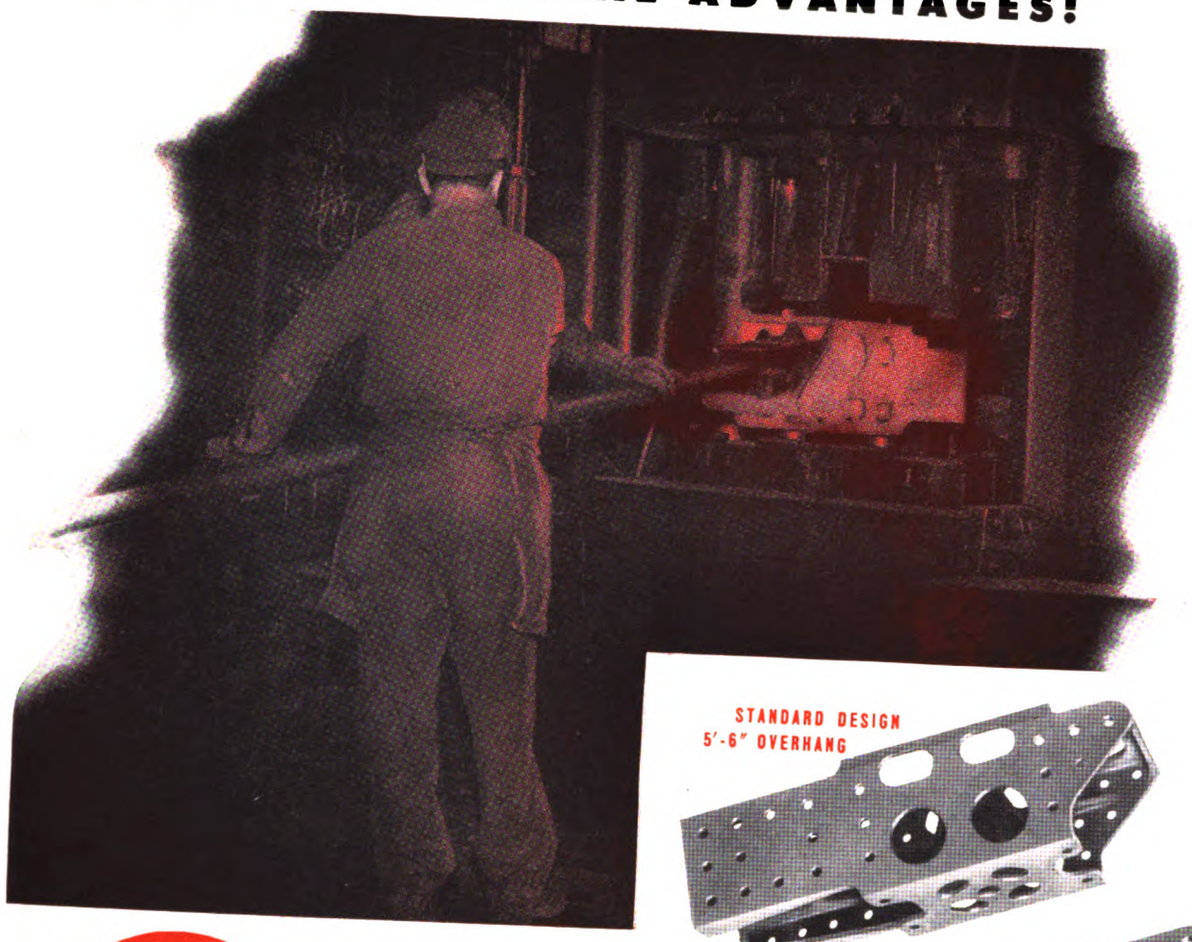
A small gas torch whch carries its own fuel supply and which is suitable for small brazing and soldering, has recently appeared on the market. The fuel cartridge, which also serves as the torch handle, contains pressurized gas, one cartridge providing for about 30 minutes operation. The temperature of the flame is approximately 3,500 deg F. Screwing a cartridge into place punctures the cartridge and a quarter turn to the left releases gas to the burner. *Morton Mail Order Company, Dept. RLC. Boonton, N. J.*

Strainer

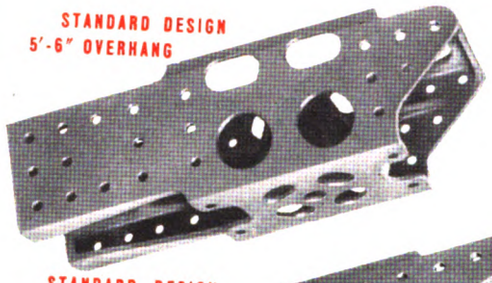
The Series 137, all-brass strainer is intended for the fine straining of air or gases and is particularly suited for keeping regulators clean. The removable strainer element is of porous bronze, straining out particles .004 in. and larger

(*Continued on page 78*)

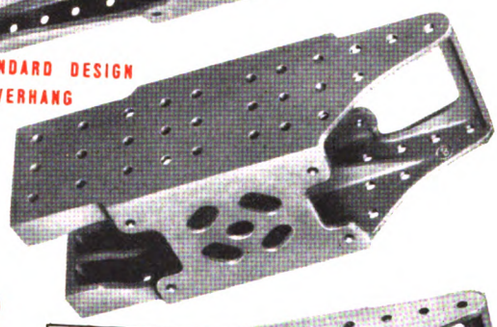
Check the ECONOMICAL ADVANTAGES!



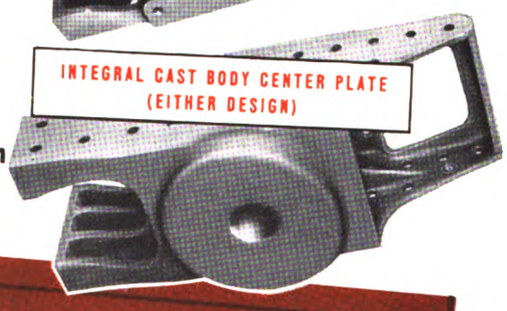
STANDARD DESIGN
5'-6" OVERHANG



STANDARD DESIGN
5'-0" OVERHANG



INTEGRAL CAST BODY CENTER PLATE
(EITHER DESIGN)



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BOLSTER CENTER FILLERS

One or Two Piece Design . . For Riveted or Slot Welded Application

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- ✓ MINIMUM WEIGHT
- ✓ MAXIMUM STRENGTH
- ✓ ALL FIT SURFACES SQUARE
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FOR COMPLETE INFORMATION
ON STANDARD OR SPECIAL DESIGNS . . CALL or WRITE

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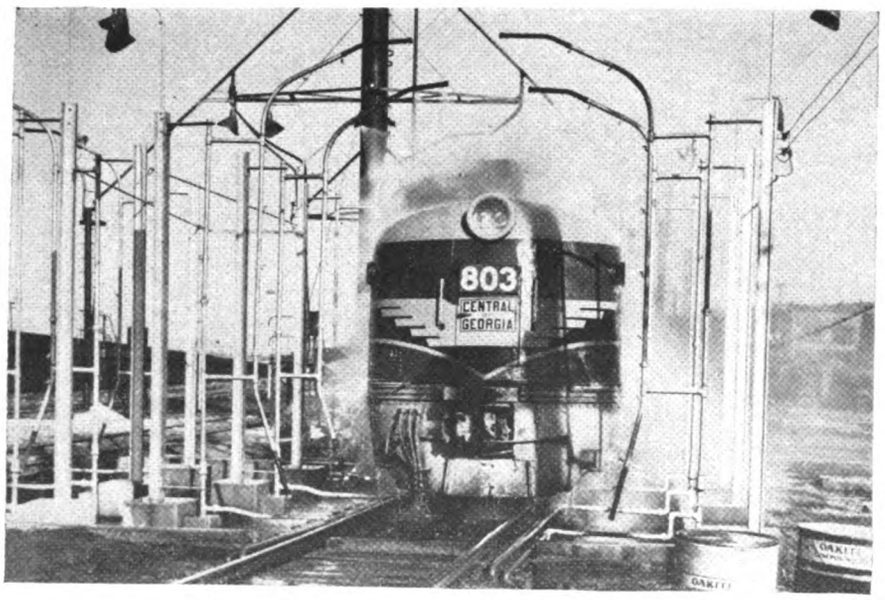
★ ST. PAUL, MINN.



In CAR WASHING, too

Oakite gives you

low-cost end results

WHY MAKE A CHOICE between *optimum* results and *economy* in car washing? With Oakite, you get both. To cite a case:

Unlike the material it replaced in an automatic car washer, Oakite Compound No. 88 thoroughly cut loose all grime, grease and road soil for easy rinse-away without streaking sides and windows. But the real pay-off was in material consumption. By using the more dilute, yet more effective Oakite solution, this railroad saved over $2600 in the space of a month.

That's why so many Class 1 roads consider Oakite materials as the standard for maintenance cleaning jobs of all types. It's a matter of *better* cleaning at *lower* cost.

56-page booklet tells you "How to make sure of the best in railroad cleaning" by taking full advantage of modern materials, methods and equipment. Write Oakite Products, Inc., 46 Rector St., New York 6, N.Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE®
MATERIALS · METHODS · SERVICE
SCIENCE

Export Division Cable Address: Oakite

RAILROAD DIVISION

EQUIPMENT

(*Continued from page 76*)

(90 microns). Available in pipe sizes ¼, ⅜, and ½ in. for pressures up to 500 psi. *Watts Regulator Company, Industrial Division, Dept. RLC, Lawrence, Mass.*

High-Potential Tester

The high-potential testing machine illustrated is capable of developing a-c voltages up to 30,000. It is a new portable bench type designed for testing insulating materials. It has an input of 115 volts, single-phase 50-60 cycle a-c, with a continuously variable output voltage from 0-30,000 volt a-c, at 1 kva, intermittant. It incorporates a 4½-in. rectifier type meter calibrated 0.30 kva, and connected directly across the voltage output so that readings are of the actual test voltage applied irrespective of transformer regulation. Other features include a leakage light, with a standard setting at 5 milliamperes, continuously variable output voltage control, and dry-type transformer construction to reduce weight. *Associated Research Inc., Dept. RLC, Chicago 18.*

Mercury Vapor Floodlights

After 4,000 hours of burning time, a 400-watt mercury vapor lamp, such as the one held by the man in the picture, has an average lumen output of about 75 per cent of the initial rating. In the foreground is shown a new line of

(*Continued on page 82*)

inspection

of renovated packing

means protection

from high maintenance costs

Short ends, fly, lint, snarls, and knots in renovated packing are specifically outlawed by the specifications of the Association of American Railroads. However, some railroad inspectors, after checking into the situation, rejected 50% more renovated packing than was previously discarded. This proves that below-standard renovated packing is still being used.

The condition is being corrected by railroads which have instituted inspection during the renovating process—the only sure way of detecting sub-standard material.

You can substantially reduce your operating costs by improving the quality of your renovated packing.

INSTITUTE OF THREAD MACHINERS INC. — JOURNAL BOX PACKING — MANUFACTURED ACCORDING TO A.A.R. SPECIFICATIONS — MEMBER

INSTITUTE OF THREAD MACHINERS, INC.

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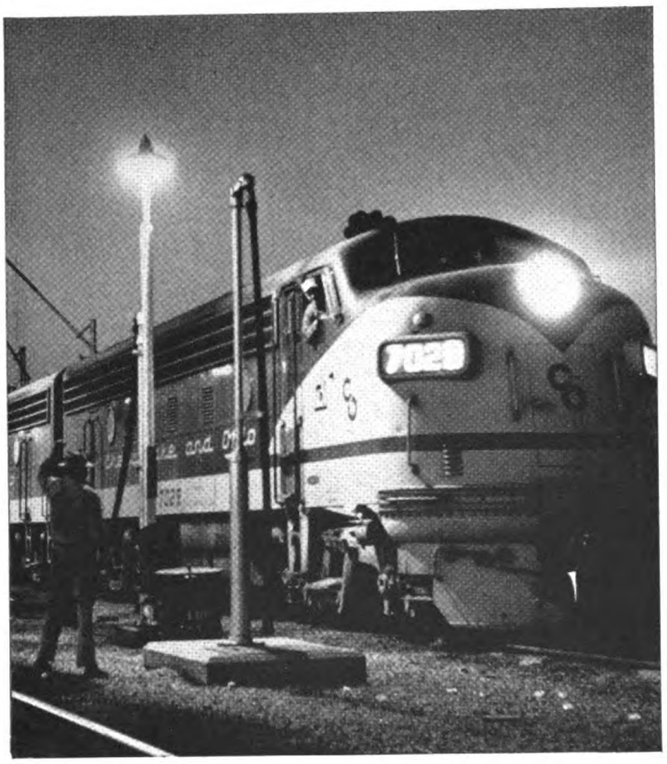
Meyer Burstein & Sons, Neenah, Wisconsin
Dallas Waste Mills, Dallas, Texas
The J. Milton Hagy Waste Works, Philadelphia, Pa.
John J. McGrath, Inc., Philadelphia, Pa.
Miller Waste Mills, Inc., Winona, Minn.
National Waste Company, New York, N. Y.
O'Neill Brothers, Inc., Philadelphia, Pa.
The Pittsburgh Waste Co., Inc., Swissvale, Pa.
Riverside Mills, Augusta, Ga.
Royal Manufacturing Company, Perth Amboy, N.J.
Southland Manufacturing Co., Inc., Norfolk, Va.
Twin City Textile Mills Waste Co., St. Paul, Minn.



This diesel will change engineers 4,078 times before it changes Ex-Cell-O pins and bushings

Ex-Cell-O Pins and Bushings wear longer because of a super-fine finish and a diamond-hard steel casing which resist clinging sand and grit. Because of this a diesel can travel 32 times around the world, changing engineers 4,078 times before Ex-Cell-O Pins and Bushings need replacement. A wonderful service policy backs up every pin and bushing by Ex-Cell-O, too.

Order directly from the convenient Ex-Cell-O Catalog . . . or contact your Ex-Cell-O Representative.

EX-CELL-O
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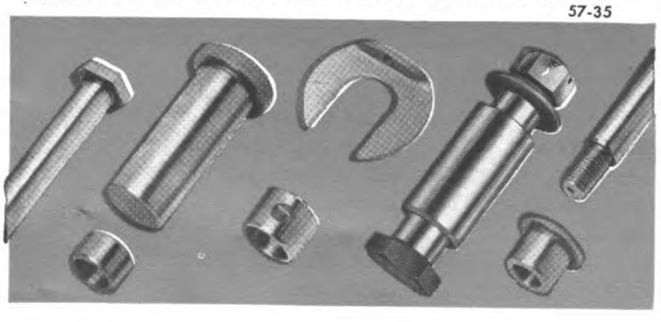
EX-CELL-O FOR PRECISION

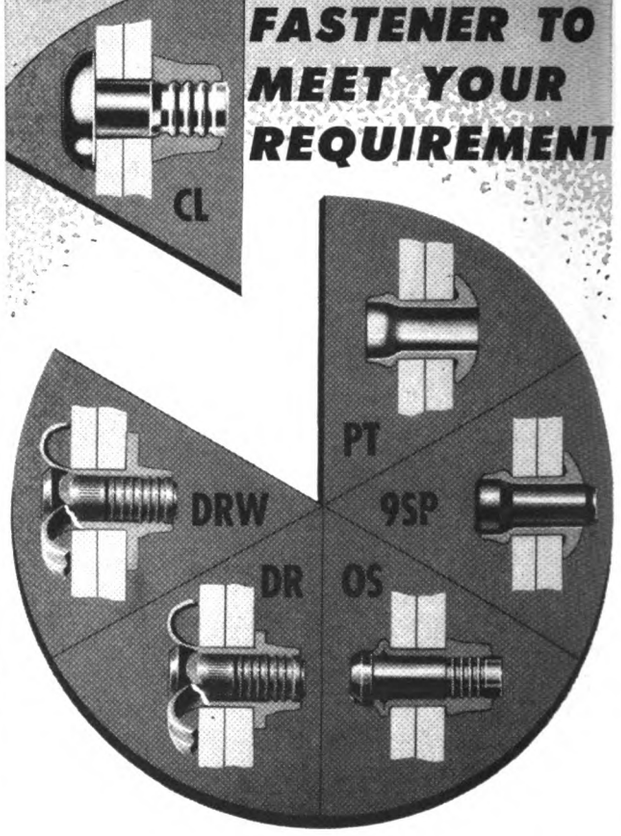
XLO

RAILROAD DIVISION • DETROIT, MICHIGAN • LONDON, CANADA

57-35



there's a HUCK FASTENER TO MEET YOUR REQUIREMENT



Hundreds of manufacturers here and abroad have found the answer to their toughest fastening problems in HUCK'S complete line of commercial, positive-locking rivets.

Huck fasteners are available in many sizes and shapes to meet the many specialized requirements of industry, from railroads to electronic fabrication. Their fast, simple application and positive locking features save production dollars, time and trouble for their many users—producing a better fastening job.

Write or call for a HUCK sales engineer to discuss your problems. There's no obligation.

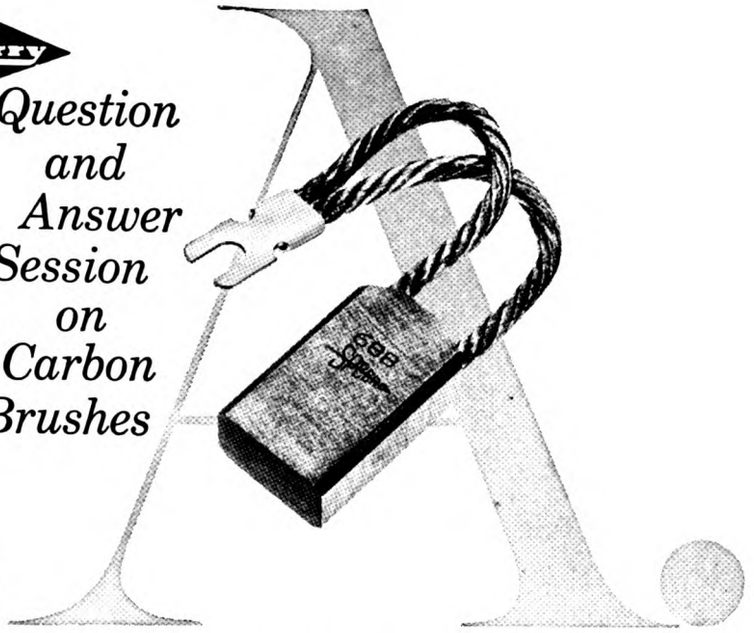
U.S. Patent numbers 2531048, 2531049, 2754703, 2527307 and patents applied for.

HUCK MANUFACTURING COMPANY

2840 Bellevue Ave. • Detroit 7, Mich. • WA 1-6207

Sperry

Question and Answer Session on Carbon Brushes



that says a lot... about QUALITY

Sperry Rail Service, Danbury, Connecticut, designers and operators of Sperry Detector Cars, inspect thousands of miles of rail in track for the nation's foremost railroads. Sperry cars have used Speer Carbon Brushes in their rail current generators since 1935.

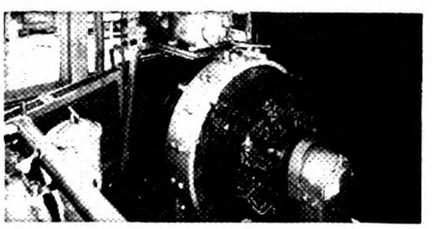
Knowing that there must be some good reasons for long use, we asked the Sperry people to tell us why. Here is their answer:

"In our operations it is important that every Detector Car have a dependable source of high-amperage, low-voltage current for testing purposes under a wide range of temperature and atmospheric conditions. Our cars have had to test in temperatures from 40 to 50 below zero to over 100°F. In the hot climates the generating compartments on our cars reach temperatures of approximately 130°F. The Speer #688 Brushes with their long life, excellent electrical characteristics and good cleaning action have given us the highest performance at lowest cost possible. We have tried other makes but have been unable to find brushes which compare with the ones we are using.

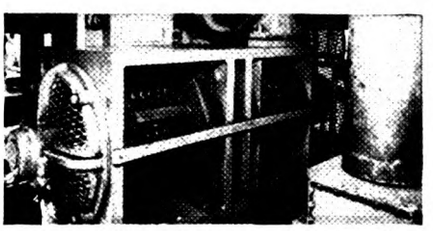
"In every Detector Car we use Speer #688 Brushes on both Rail Current Generators. One of these is a Chandeysson H8-43 Homopolar Generator from which we take 9,000 amps. at voltages from approximately 1.5v to 2.2v. This generator uses 192 brushes. The other is a Chandeysson BP17 Double Commutator Generator from which we take from 1,500 to 2,000 amps. from each side – double these figures for total output, also at voltages of from about 1.0v to 2.0v. Eighty brushes are used per unit. On this generator the commutator mica is not undercut but left flush with the commutator surface. This requires a hard brush with good cleaning action such as the Speer 688.

"The Speer Carbon Company representative has maintained close personal contact with us since we started using Speer brushes. To our way of thinking he is the most competent authority on electrical commutation we know."

This is but one railroad customer reaction to one type of Speer carbon brush for railroad use. Speer brushes can do as much for you and there is a type for every kind of railroad application.



Chandeysson BP17-4000 amperes, 2-volt generator uses 64 #688 Speer Brushes

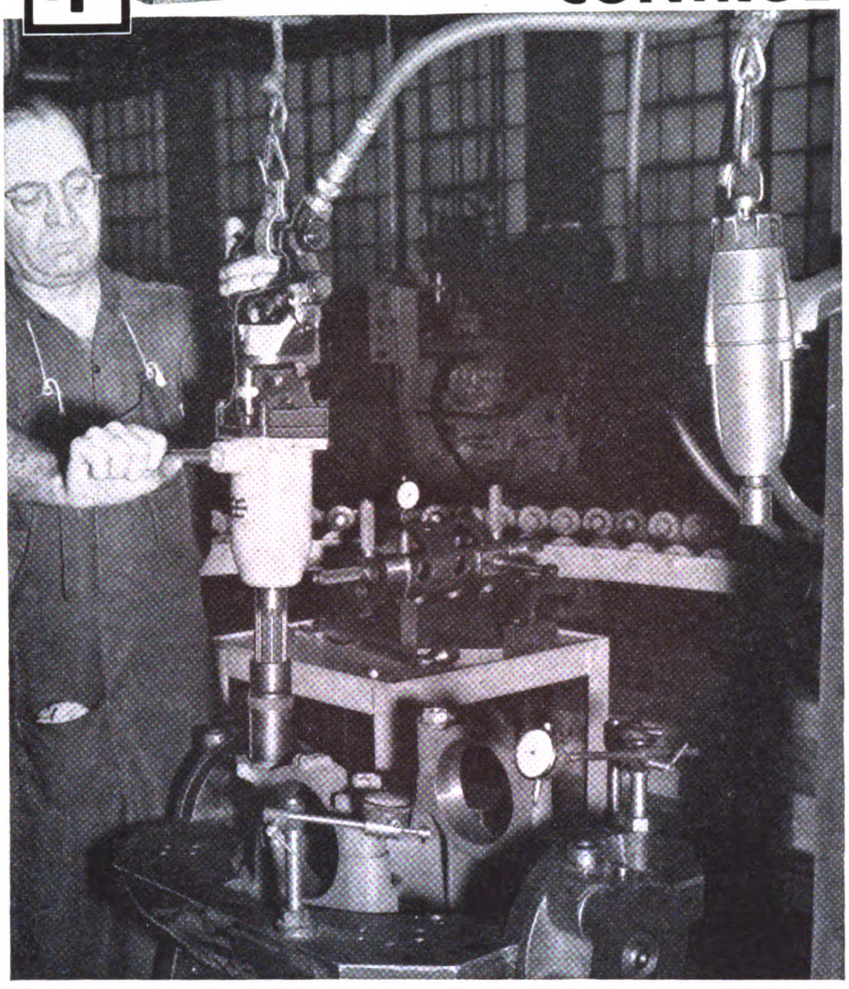


2 Chandeysson H8-43 Homopolar Generators produce 4500 amperes, 2 volts per unit. Each uses 96 #688 Speer Brushes.

Available for the asking is the book, "Brushes by Speer," which describes the complete line of Speer Brushes.

SPEER Carbon Co.
St. Marys, Pa.

I-R TORSION BAR TORQUE CONTROL



TORQUE CONTROL IMPACTOOLS

consistently run nuts to prescribed torques

I-R Torsion-Bar Impactools now assure top quality control on these 3 operations:

1. *Assembling differential main bearing caps at 450 ft. lbs.* both before and after machining as shown above.
2. *Preloading differential drive pinion bearing* with Impactools set at 375 ft. lbs.
3. *Assembling wheels to wheel hubs at* 425 ft. lbs.

Quality control has risen to a new high for this large manufacturer of farm equipment since I-R Torsion-Bar Torque Control Impactools were installed.

These Impactools are the *only* power wrenches that deliver full power and speed until the preset torque is reached, and then instantly and automatically shut off.

Now, with Torque Control Impactools, the company consistently runs nuts to prescribed torques, saves time, improves quality and eliminates hand torque checking operations.

Write for Bulletin 5170 for proof of how these amazing Impactools can improve quality and cut costs on your own applications.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

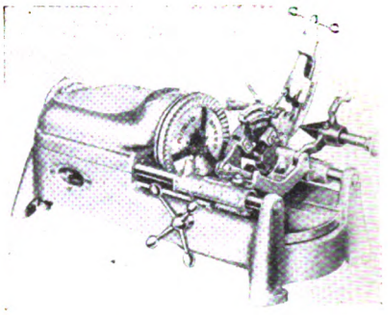
8-524

EQUIPMENT

(*Continued from page 7*)

mercury vapor floodlights which give the lighting engineer a wider choice of equipment and enables him to solve many lighting problems with mercury.

The floodlights with new outdoor mercury ballasts and color-improved mercury lamps with an increased longevity and higher maintained lumen output are making mercury floodlighting suitable for a greater diversity of applications. They are available in various types of housings with a choice of beam spreads and beam candlepower, for 250, 400 and 1,000 watt lamps. They are heavy-duty fixtures equipped with a wide or narrow beam reflector. A cast aluminum alloy housing makes the fixtures dust-tight and weatherproof. Protective painting is unnecessary under normal conditions. *Crouse-Hinds Company, Dept. RLC, Syracuse, N. Y.*



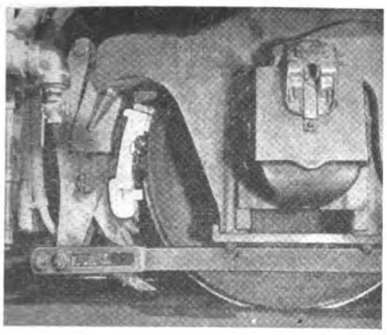
Threading Machine

The Ridgid 535, pipe and bolt threading machine, has a universal die head, and includes 2 sets of dies to thread ½ in. to 2 in. pipe or conduit, a roll-type cut-off with self-centering, full-floating cutter wheel, and a five-flute cone reamer with a 2 in. capacity. Operating independently, all tools swing up out of way when not in use.

Machine also has a concealed oil system, lathe-type adjustable carriage handle and a length gage. Allen wrenches, tube of grease, 3 gal of Ridgoil and an extra cutter wheel are regularly supplied. *Ridge Tool Company, Dept. RLC, Elyria, Ohio.*

Flange Cutter

The SD-5 L&M wheel machining apparatus is designed to restore flanges to proper contour with a unit which replaces the brake shoe instead of the brake head which was the arrangement used for this manufacturer's earlier models.The body of this apparatus—its head—is attached to the locomotive brake head with the conventional brake shoe key. In addition to this heavy cast-steel head, each machining appa-



ratus includes a set of three heat-treated, tool-steel flange forming tools and the lugs, spacers and tread riders which accommodate different types of locomotives and make possible adjustments during the machining.

The tool can be installed without putting the locomotive over a pit. Moving the tool to another wheel, or making adjustment during cutting can be done on the outside track where the machining is done. Wheel cutting should be done at about 1 rpm. and this can be achieved with some locomotives by blocking the generator field contactor and allowing only the exciter field contactor to close. From 15 to 30 psi brake cylinder pressure should be used. One test showed that with two pairs of wheels equipped with these SD-5's simultaneously, average locomotive out-of-service time per pair of wheels cut was 1.67 hr. *Durametallic Corporation, Dept. RLC, 24 Commerce st., Newark, N. J.*

Motor Generator Welders

A new line of motor-generator welders features prelubricated sealed bearings, controlled current peaks and space-saving design.

The driving motors and motor starters on the dual-voltage machines are designed to adapt voltage re-connection without changing overload relay heaters and other accessories. An improved magnetic starter, with a fast response overload relay prevents motor burnout in event of overload. All bearings are rubber-mounted and oversize.

The welders are said to produce the

small, lightweight air hoist gives you greater VERSATILITY

Ingersoll-Rand

AIR-BLOC combines safety, ruggedness and mobility...

Move it anywhere . . . hang it anywhere . . . the I-R AIR-BLOC gives you versatility you never thought possible for speedy handling of loads up to 1000 pounds. No mechanical brake to fail . . . load can't drop even if air pressure fails. Responsive throttle control and automatic up-down-stop permit extremely accurate handling. There's a size just right for your job.

Portable winch-type Utility Hoists, in a wide range of sizes up to 4000 lbs., are also available from Ingersoll-Rand.

PENDENT THROTTLE

The only complete line of air hoists with convenient "one-hand" control.

- Speeds spotting of loads.
- Provides "Finger-tip" control over full range of speeds.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

AIR HOISTS up to 24,000 lbs.

8-529

same high recovery voltages and controlled current peaks with pop-out-free arcs as engine-driven units.

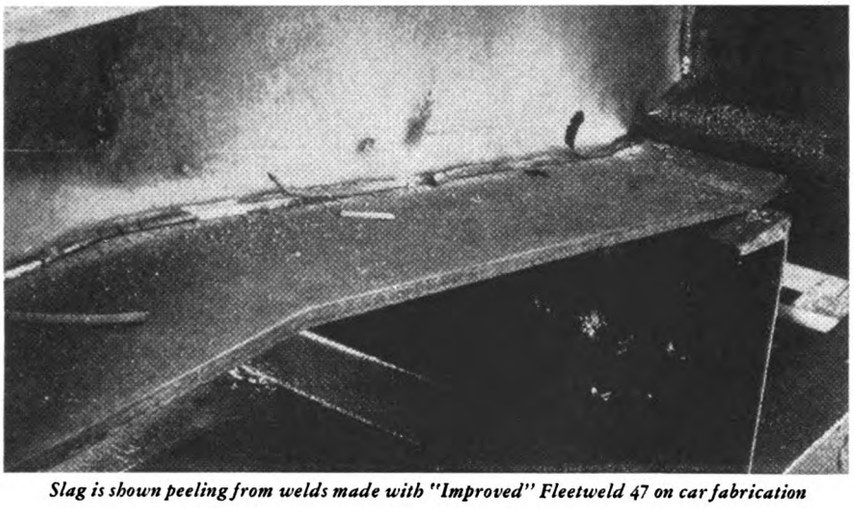
These units, built with push-button controls, include generator, driving motor and accessories, all in a weather-resistant, self-ventilated case. The compact design permits stacking of welders to reduce floor space.

According to the manufacturer, these new welder-generators can be used for practically all industrial applications including light, medium and heavy d-c metal arc and inert arc welding. *General Electric Company, Dept. RLC, Schenectady 5, N. Y.*

Aluminum Car Doors

Aluminum baggage car doors, designed to replace steel units twice their weight, are being tested by the Pennsylvania. Eight doors have been installed on two PRR cars for test. The weight reduction, approximately 166 lb per door, facilitates the opening and closing.

Framework of each door is an all-welded assembly of Alcoa extrusions in alloy 6063-T6. Alloy 3003 sheets, riveted to this framework, forms the facing. The doors are suspended from roller-mounted, cast aluminum hangers. A specially designed extrusion slides along a grooved track in the car floor to guide lower edge of the door. *Aluminum Company of America, Dept. RLC,* 1501 *Alcoa bldg., Pittsburgh 19.*



Slag is shown peeling from welds made with "Improved" Fleetweld 47 on car fabrication

SAVE UP TO 30% OF WELDING COSTS WITH "IMPROVED" FLEETWELD 47

the iron-powder electrode for high-speed, down-hand and out-of-position welding

By actual comparison "Improved" Fleetweld 47 has been proven superior to conventional E-6013 electrodes.

- **Deposition rate is 10% to 30% higher**
- **Up to 30% more weld per rod, resulting in fewer electrode changes and higher operating factor**
- **Easy operation — no tendency for sticking on AC or DC**
- **Self cleaning . . . low spatter**

You can meet all E-6013 requirements and save money at the same time. Try "Improved" Fleetweld 47 and prove it to yourself.

FABRICATORS!

Send for Weldirectory SB-1351 for specifications and procedures on mild steel electrodes.

Write Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio. Railroad representatives of:

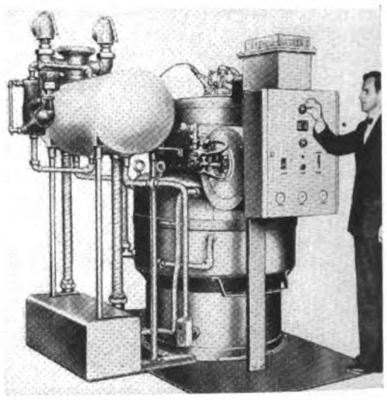
THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

The World's Largest Manufacturer of Arc Welding Equipment

When "Improved" Fleetweld 47 **Has** the speed of an iron-powder rod **Yet** operates in all positions

WHY use anything else with mild steel?



Water Tube Heating Boiler

The 150-hp drum type Vapor Modulatic water tube boiler is mounted on a steel base plate and is about one-third the size of a conventional boiler of the same capacity. It is designed to produce low pressure steam, 5- to 15-lb pressure for heating industrial plants and commercial buildings. Other models are planned to produce 1,000 to 5,000 lb of low pressure steam up to 125-lb pressure.

Equipped with complete safety controls, this boiler is said to develop steam in 5 min. from a cold start. Hot gases from a forced draft fire, burning oil or city gas, wipe over and around four sets of steel coils heating the water pumped through the coils. Two turbine water pumps recirculate the water from the steam drum through the coils. Steam rising from the drum passes through a specially designed separator located in the drum. The separator removes the excess moisture in the steam before it goes to the steam heating system.

This model is 96 in. high, 80 in. wide and 96 in. long; shipping weight, 7,400 lb. *Vapor Heating Corporation, Dept. RLC, 80 East Jackson blvd., Chicago 4.*

(Turn to page 86)

Check list for a customer:

to measure the responsibility of a supplier

You expect to purchase good products from any supplier with whom you place an order.

Your own business acumen and experience take care of that. In addition, you expect, and deserve, the things sometimes referred to in contracts as "other considerations".

"Other considerations" are a matter of *responsibility*—the obligation of a good supplier to earn his good name.

This is the first of a series of advertisements in which we are going to look at our business from where you stand—and invite you to share the view.

We want to discuss *responsibility*—for we believe "responsibility" is the foundation of business. We want to discuss *price*—what a reasonable price should be in relation to continually rising material and labor costs.

We'll discuss *delivery*. The experiences of 1956 verify its importance. And delivery becomes *customer-service* when it means the same careful attention to orders for repair parts as was given to your original order. Here is where performance after the sale measures the worth of a supplier.

And we'll show how Research and Development challenges the best *product* to be better with new *money saving products* and *service*.

In the months to come we'll invite comparison—and do it with confidence. Only you can objectively hold the yardstick up.

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY

General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco

Standard Railway Equipment Manufacturing Company, (Canada) Ltd. Sun Life Building, Montreal

MEMBER

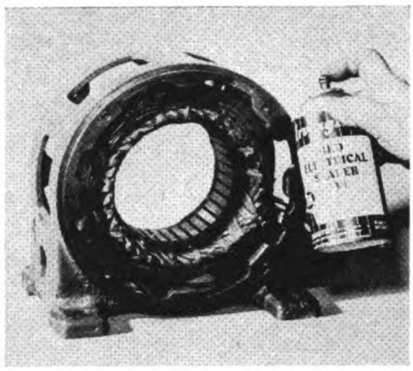
EQUIPMENT

(*Continued from page 84*)

Insulating Varnish Applicators

Two applicator cans for convenient application of electrical insulating enamel have been announced. The container shown is a 12-ounce pressurized can, is designed for spraying of electrical components, motor coils, strators, and commutator ends for protection from moisture, oil and chemicals.

The second container, holding 8 fluid ounces, is fitted with a brush top applicator for brushing on heavier layers of the electrical sealer.

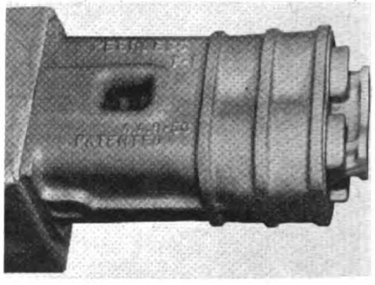


Both contain Irvington brand No. 30 red electrical sealer, an Air-drying enamel which can also be thermoset with a short bake at 200 to 220 deg F. A brush coat air-dries to handle in about three hours and is hard dry after eight hours. The enamel has a dielectric strength of 850 volts per mil and applies at about 5 mils to the coat with a brush. The spray applicator lays down a thinner coating. *Irvington Division, Minnesota Mining & Manufacturing Co., Dept. RLC, Irvington 11, N. J.*

Car Cleaner

The Mighty-Mulse Special solvent has been developed to remove diesel exhaust stains and road grime from the exteriors of aluminum and stainless steel railroad cars. Producers say it will not attack metals, glass, plexiglas, rubber, or paint. Safety is based on its high flash point of 160 deg F., and its non-irritating, nontoxic characteristics.

Applied by spray or brush, solution is mixed with nine parts of kerosene, allowed about 10 min to work in, and hosed off with cold water. A hot water rinse results in faster drying. *Octagon Process, Inc., Dept. RLC, 27 Bank st., Staten Island 1, N. Y.*



Draft Gear Features Twin Parts

A new design of standard pocket metallic friction freight car draft gear, the Peerless Type T-1, has recently been granted a conditional certificate of approval by the AAR.

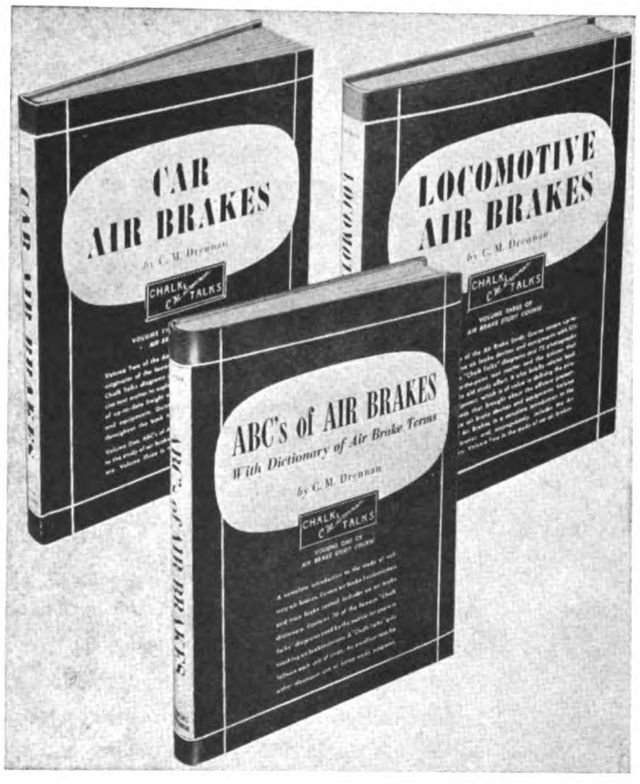
Each set of two friction shoes is resisted by its separate spring nest and operates independently of the other. Both sets of shoes are actuated by a common wedge, and during operation both groups work together. According to the manufacturer, this arrangement produces better uniformity of operation, together with high capacity and low terminal forces.

All parts are made from heat-treated high grade steels, insuring maximum durability, it is said, during normal life of device. The housing is alloy cast steel and the frction shoes, wedges and spring caps are drop forgings. The springs are high-carbon spring steel. *Poor & Company, Peerless Equipment Division, Dept. RLC, 332 S. Michigan Ave., Chicago 4.*

(*Turn to page 88*)

3-Vol. Complete Air Brake Course

for apprentice classes or individual study



Written by C. M. Drennan, famed air brake teacher formerly with Westinghouse, these books utilize Mr. Drennan's tested and effective "Chalk Talks" method consisting of clear, simplified "blackboard" drawings that make the function of every part easily understood. Many photographs of equipment are also included. Interspersed throughout all three volumes are quizzes for review and testing of the student's progress.

Vol. 1 (ABC's of Air Brakes) covers friction and braking ratio and freight and passenger train brake control; function and operation of pistons, valves, electric controls and other components. Dictionary of words and terms used in air brake work.

Vol. 2 (Car Air Brakes) covers all car air brake valves and other devices; freight car brakes—AB, ABLC and AC. Passenger car brakes—D-22-P; electro-pneumatic; speed-governor control; Decelostat equipment; universal control.

Vol. 3 (Locomotive Air Brakes) is a thorough exposition of all locomotive brake equipments. Covers air compressors, relay valves and miscellaneous devices. ET equipments and modifications and 24-RL equipment; equipments with electric controls; braking force control.

SIMMONS-BOARDMAN BOOKS
30 Church St., New York 7, N. Y.

LC657

Send postage prepaid:
.....copies ABC's of Air Brakes ($4.75 ea.)
.....copies Car Air Brakes ($4.75 ea.)
.....copies Locomotive Air Brakes ($6.75 ea.)
.....3-vol. sets ($15.00 ea.)

I enclose check or money order for $..... If I am not satisfied, I may return books for full refund within 10 days after receipt. (Substantial reductions for group orders; prices on request.)

Name .....

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City, zone, state .....

Full Refund in 10 Days If Not Fully Satisfied

NEW *Utility* PRESS BY

FJELLMAN AMERICAN

for Forcing, Bending, Forming, Drawing up to

200 TONS

ONLY 8'7" D. x 4'5" W. x 11'3" H.

Here's a unique, compact press — ideal for custom forming where pressures up to 200 tons are required — with infinitely variable pressure-control. Its goose-neck design, 300° loading arc, high throat and long, exacting stroke make the Fjellman American utility press an extremely versatile machine for your custom production and repair department assignments.

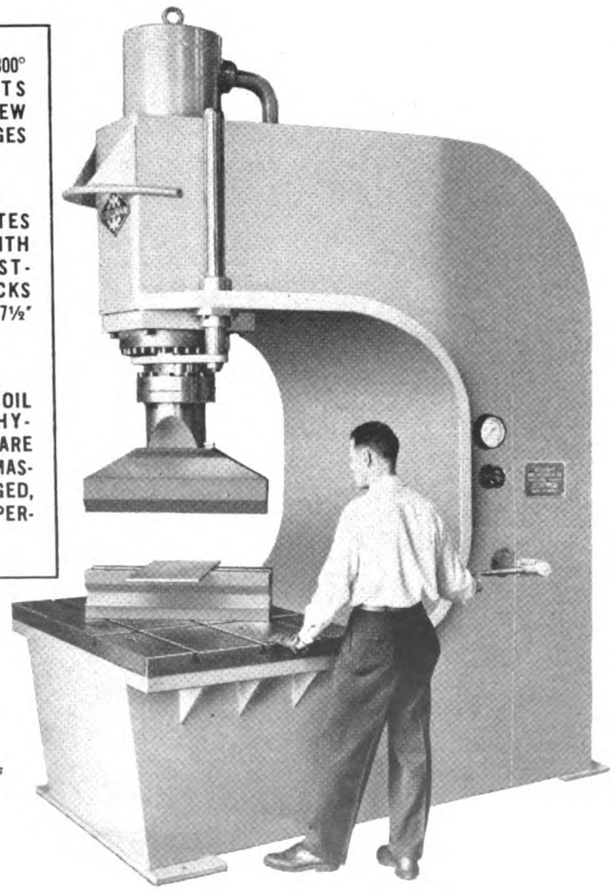
FJELLMAN AMERICAN, INC.

105 Republic Avenue • Joliet, Illinois

▶LOADS THROUGH A 300° OPENING. PERMITS OPERATOR FULL VIEW OF WORK AND GAUGES EVERY MOMENT.

▶PRESSURE REGULATES IN AN INSTANT WITH FINGERTIP ADJUSTMENT. PISTON LOCKS ANYWHERE WITHIN 27½" STROKE.

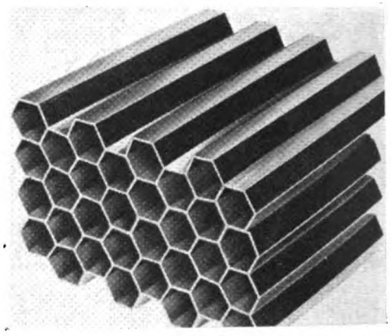
▶TWO-STAGE PUMP, OIL RESERVOIR AND HYDRAULIC SYSTEM ARE HOUSED WITHIN MASSIVE FRAME. RUGGED, CLEAN, EFFICIENT OPERATION.



Write for complete data and specifications

EQUIPMENT

(*Continued from page 86*)



Journal Lubricator

A journal-box lubricator, said by its manufacturer to be the first to have the rubber honeycombed construction, is designed to outperform waste packing four to five times. The honeycomb acts as a spring to hold the oil-soaked blanket against the journal. This pad of cotton and wool fibers, coated on the underside with Hycar latex to secure the threads, applies the film of oil as the journal rotates. Oil from the bottom of the journal box wicks up by capillary action to keep the blanket wet.

The Hycar honeycomb core, reported as more oil resistant and lower in cost than either sponge or foam rubber, provides resilience in a direction at right angles to the cells, but is rigid in a direction parallel to the cells. This is to permit pushing the pads into the box without bulging or stubbing. Pads are installed without jacking. *Miller Lubricator Company, Dept. RLC, Winona, Minn.*

Shop Desk

This cabinet-type shop desk has a sloping writing top, a protective hood with pigeon holes and pen holders, a roomy drawer with flat key lock and formed footcaps for each leg. It is designed for stand-up writing jobs, and provides a lock-equipped storage section.

The desk's enclosed lower section is adjustable, and an additional half shelf can be added to double the capacity.

The desk is constructed of steel and is finished in olive green or gray baked-on

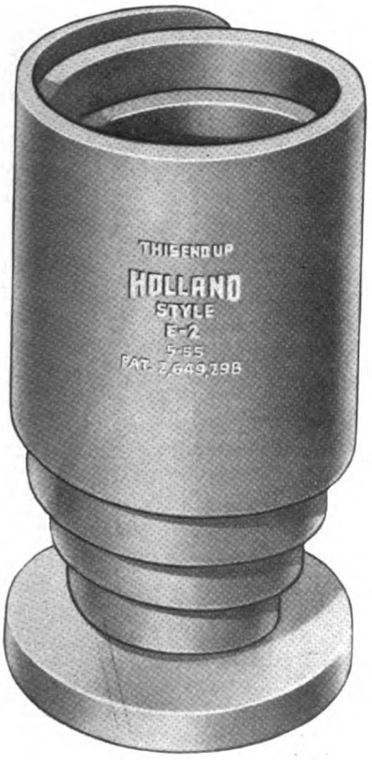
(*Continued on page 90*)

the Original snubber spring

Holland Volute Snubber Springs are NOT miniature Draft Gears. They are effective Load-Carrying SPRINGS as well as highly efficient FRICTION SNUBBING DEVICES for Freight Cars.

Either 1⅝" or 2½" Spring Travel

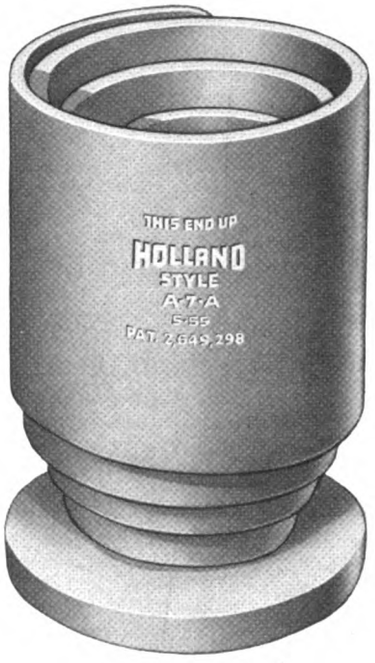
They are easily applied by simply removing one standard Bolster Spring from each spring nest, and replacing it with a Holland Volute Snubber Spring.



2½" Travel

HOLLAND STYLE A-7-A VOLUTE SNUBBER SPRING IN 40-TON GROUP

Write for New Bulletin #15A describing in detail the Unit Snubber.

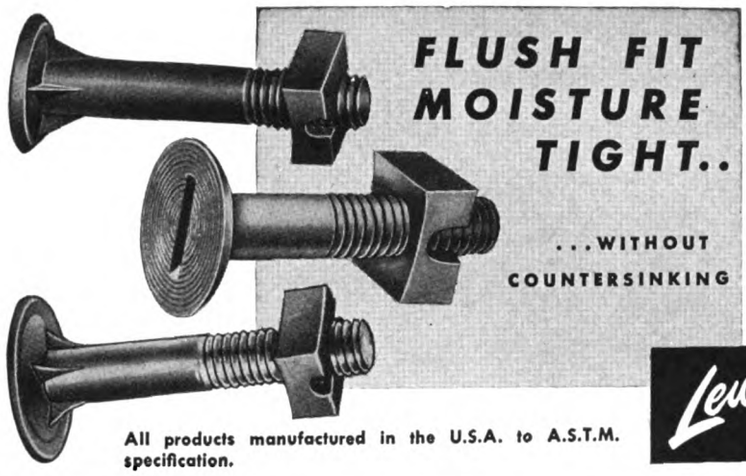


1⅝" Travel

HOLLAND COMPANY

332 S. MICHIGAN AVE. CHICAGO 4, ILLINOIS

388-RPSR



Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF QUALITY U

EQUIPMENT

(*Continued from page 88*)

enamel. The overall height is 52¼ in., width, 33 in. and depth, 28⅞ in. *Republic Steel Corporation, Dept. RLC, Berger Division, Canton 5, Ohio.*

Dry Rust Remover

Oakite Drycid, a powdered acid material to remove rust, scale, and corrosion, has been developed for increased safety to metal surfaces and personnel. Added to water in concentrations upwards of eight ounces to the gallon, it is said to go into solution rapidly and to be useful in applications by circulation or immersion. The solution may be used cold or heated to 165 deg F for faster action, and is reported very effective in the removal of scale-like deposits, rust, iron sulphides and other oxides.

The advantages of this new material is its ease in shipment and in storage. It requires no returnable carboys, being shipped in fiber drums. For the workers' comfort this chemical has a mild, aromatic odor and a non-fuming characteristic. Greater safety on aluminum, brass and galvanized surfaces when used as recommended is stressed by its producers. *Oakite Products, Inc. Dept RLC, 146 Rector st., New York 6.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

WIRE ROPE SLINGS. Three folders suggest applications and ordering specifications for wire rope slings—Uniflex for use where abrasion occurs; Multiflex for maximum load-bearing surface area and ultimate flexibility in one direction, and Maxiflex slings for flexibility in all directions. (Write: *Advertising Dept., Colorado Fuel & Iron Corp.*, Dept. RLC, 575 Madison ave., New York 21.)

CONTROLLED ARC POWER SUPPLY. Four-page folder gives details about M&T controlled arc power supply for simplified, faster and more uniform semi-automatic or full-automatic welding. (Write: *Metal & Thermit Corp.*, Dept. RLC, Rahway, N. J.)

METALLIZING SERVICE. Bulletin deals with metallizing, a process of spraying molten metals onto a base surface to build up worn mechanical equipment, to apply hard wearing surfaces, to correct surface defects, and to restore dimensions. (Write: *Protective Coatings Division of Metalweld, Inc.*, Dept. RLC, Scotts Lane and Abbottsford ave., Philadelphia.)

PIPING SYSTEM IDENTIFICATON. 4-page illustrated manual, No. 117, contains specifications approved by the American Standards Association in conjunction with the National Safety Council and the ASME. Lists colors to be used for each class of fluids and gases, gives size and frequency of legends, and explains the dual methods recommended, by color and legend. (Write: *Rust-Oleum Corporation*, Dept. RLC, 2799 Oakton st., Evanston, Ill.)

CAR PULLERS. 32-page Bulletin J-11 describes various types of Jones car pullers for moving freight cars, barges, scrap buggies, etc., also several installations. (Write: *Hewitt-Robins, Inc.*, Dept. RLC, 666 Glenbrook Road, Stamford, Conn.)

INDUSTRIAL GAS EQUIPMENT. 24-page catalog (Form 4486—Oxweld Catalog Section 4) describes industrial gas manifolds with automatic controls, also acetylene generators capable of delivering from 100 to 9,000 cu ft of acetylene per hr. Recommended uses and specifications given for equipment for gas piping systems, including hydraulic back-pressure valves, relief valves, station valves, oxygen filters, and station check valves. (Write: *Linde Company*, Dept. RLC, 30 East 42nd st., New York 17.)

"WROUGHT IRON FOR RAILROADS." 36-page booklet reviews briefly mechanical and engineering uses of wrought iron in railroad service, with illustrations of some of the more outstanding applications. (Write: *A. M. Byers Company*, Dept. RLC, Pittsburgh 22.)

LIQUID FILTERS. 16-page LFC catalog gives complete data for designers and users of equipment requiring full-flow filtration of lubricating, hydraulic or fuel oils. Includes also specific data on gpm, pressure drop, inlet and outlet sizes, weight, overall dimensions and required clearance for cartridge removal for wide range of filter models. (Write: *Air-Maze Corporation*, Dept. RLC, 25000 Miles Road, Cleveland 28.)

LUBRICATION FITTINGS. 32-page catalog of lubrication fittings—from the original Alemite "pin type" to the newest "Red Ball" hydraulic type—lists also fittings for special purposes, such as relief fittings, measuring fittings, drive fittings, etc., and accessories, such as bushings, elbow bodies, fitting extensions, plugs, couplers and nozzles, etc., with specifications and dimensions. (Write: *Stewart-Warner Corporation*, Dept. RLC, 1826 Diversey Parkway, Chicago 14.)

(*Continued from page 14*)

liquid or solid fuel, according to Mr. Wright.

Various solid and liquid fuels for present diesel engines are also under study at the laboratory. The NYC diesel fuel test program (see Railway Locomotives and Cars, October 1956, page 53) is now being conducted on a road locomotive operating between Cleveland and Toledo. The engine is being fired with a "special" oil—a sidestream fuel from the catalytic cracking process. This fuel must be treated with dispersants and heated with engine jacket water for satisfactory combustion, but offers the NYC a saving of 1 cent per gal under the road's present standard "economy" fuel, according to the director. Fuel oil prices quoted were 9.5 cents per gal for the "sidestream" fuel; 10.5 cents per gal for NYC "Economy" fuel, and 11.5 cents per gal for regular diesel oil.

The system-wide use of "economy" fuel already yields a saving of 1 cent per gal and tests have shown that a 1,500-hp freight unit uses 7 gal less fuel per hr at full load because of the higher heat content of the lower grade oil. Problems of handling and burning this oil are solved with proper dispersant treatment which can be confirmed and checked with the NYC's electron microscope, an important tool in the laboratory. The NYC adds its own dispersants.

The possibility of enriching diesel oils with finely dispersed coal particles is being investigated by the NYC as part of an active atomic energy program. According to Mr. Pearlman, the road's atomic interests are twofold: (1) for production of actual power, and (2) as a tool for research and actual applications.

The Canadian government, through the McGill University in Montreal, is also sponsoring a closed-cycle gas-turbine project.

Gass Predicts 50,000-Car Increase in Freight Fleet

Chairman A. H. Gass of the Car Service Division, AAR, has interpreted first-quarter installations and retirements as indicating that there will be a 50,000-car increase this year in the freight fleet of Class I railroads.

Mr. Gass made this prediction in his latest review of "The National Transportation Situation." He noted that the Class I roads installed 23,265 new cars in this year's first three months when retirements totaled 10,644 cars. First-quarter installations by car-line affiliates of the Class I roads totaled another 1,185 cars.

March installations by those roads and car lines totaled 9,231 cars, more than in any previous month in nearly 5½ years—since November 1951. Their order backlog as of April 1 totaled 99,054 cars.

The serviceable fleet of Class I roads on April 1 totaled 1,650,084 cars, 23,110 cars more than a year earlier.

NOW! We Can Service Your Traction Motor Field Coils

WITH EPOXI-MICA INSULATION

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1. HIGH DIELECTRIC STRENGTH.
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New and rebuilt field coils can be supplied cast to pole pieces.

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- **Over 20 railroads are now using from one to six TAKK D.C. insulation test sets in daily operations.**
- **Canadian Pacific, Norfolk & Western, New York Central, Illinois Central, Canadian National, Santa Fe, Southern and Union Pacific are a few of the progressive roads now using these sets.**

THREE BIG ADVANTAGES OF DC TESTING:

- Unlike AC, it shows relative condition of insulation and effectiveness of corrective measures.
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THE TANK 5-KV SET (photo) performs standard resistance and over-potential tests on electrical systems of 5,000 volts and under. Its continuously variable voltage range and accurate and rugged micro-ammeter make it suitable for testing anything from the smallest test sample to the largest traction motor or diesel electric generator. It shows insulation leakage currents likely to be encountered in almost any test . . . from 0.01 micro-amperes to 1.0 milliampere.

SMALL, LIGHT AND RUGGED. The TAKK set combines complete portability (less than 1 foot cube, weighs less than 15 pounds) with accuracy, ruggedness, easy operation and moderate cost. Powered from a standard convenience outlet, it's completely safe for both operator and equipment. For heavy electrical equipment, higher voltage TAKK sets rated at 15, 30 and 45 KV are in widespread use.

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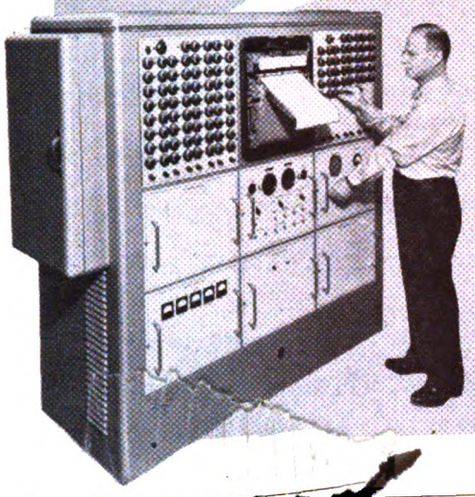

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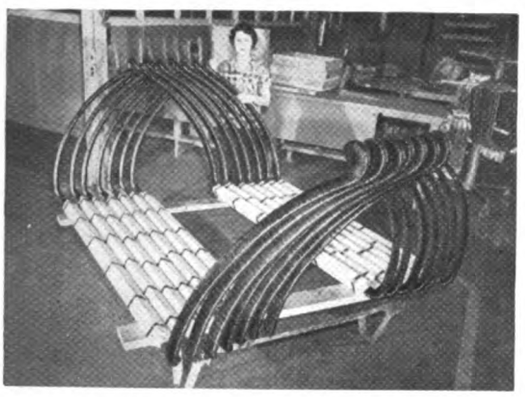
National Replacement Coils

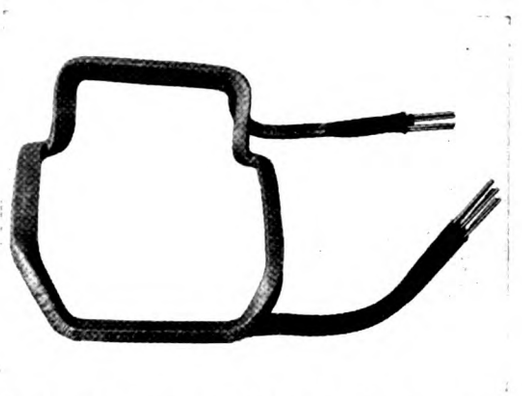
Help Keep Vital Motors and Generators on the Job . . .

. . . IN THE ELECTRIC POWER INDUSTRY



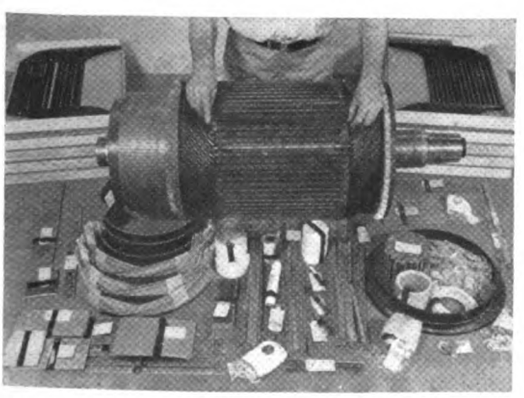
The photo shows part of a set of 54 stator coils for a large AC turbo generator. Rewinding equipment of this size is normally done on the job site. National can furnish the coils and send a full winding crew (or supervisory personnel with the customer supplying the labor), or National can supply the coils only (with the customer handling the complete installation).

. . . IN THE MINING INDUSTRY



Mines use National coils in the motors which power mine locomotives, shuttle cars, conveyors and other equipment. National "grew up" in the coal fields and really understands the electrical maintenance problems of the mining industry. The photo shows a typical armature coil for a mine locomotive motor.

. . . IN THE RAILROAD INDUSTRY



Some railroads send their traction motors to National shops for rewinding. Others perform the work in their own shops, using National replacement coils and winding supplies. The photo shows the variety of materials which go into a complete National rewinding kit for a traction motor armature.

. . . IN THE STEEL INDUSTRY

The steel industry depends on National for replacement coils because rugged, reliable National coils have proved their ability to meet the test of tough steel mill operating conditions. The photo shows armature coils for a DC mill motor being dipped in a silicone varnish to protect them against deterioration due to high temperatures.

When you need coils for any rotating electrical equipment, you can count on National for top quality, good service and a reasonable price. Ask your National field engineer for details on how National coils can help simplify your motor and generator maintenance problems. If you don't know him, just drop us a line and we'll arrange to have him get in touch with you.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

TRADE MARK

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

New facts about an old problem, wheel slip—and how to eliminate it

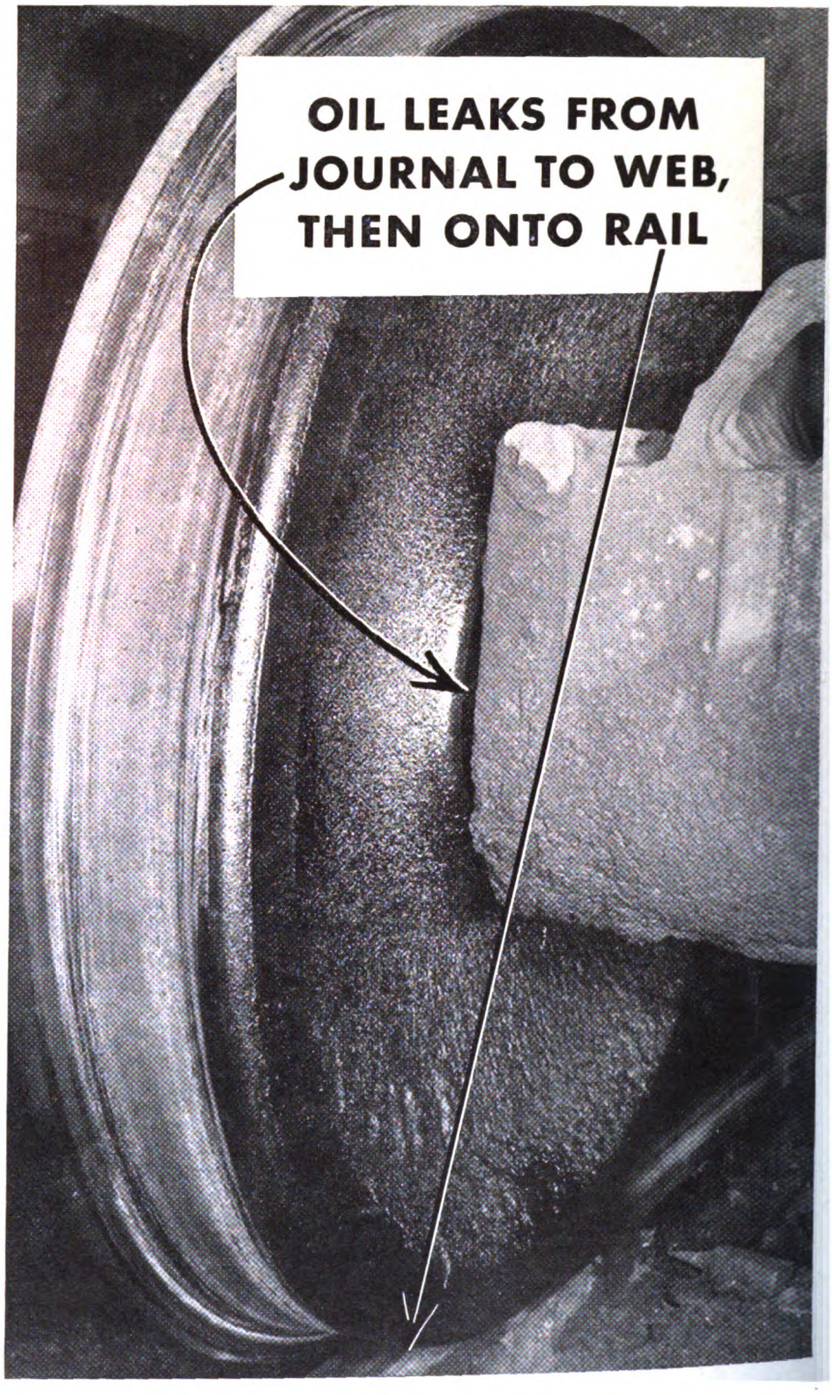
RAILROADS have become increasingly aware of diesel-electric locomotive wheel slip. And they've discovered that a major cause of slip is oil leaking onto the rail from the journals of friction-bearing-equipped freight cars. Oil runs down the wheel web to the tread and is deposited on the rail. And then it is spread over the rail by fog, dew, or light rain.

When a diesel-electric locomotive hits an oily section of track, the driving wheels slip and motor armatures overspeed. This can cause "flashover" in both traction motors and generators and can result in (1) burned-out armatures and loosened windings, (2) locked axles (causing flattened wheels, scored rails and sometimes wrecks), and (3) repairs on locomotive generators and drive motors.

Some railroads are installing "slip indicators". These pinpoint *where* the wheel slip is occurring. But they can't eliminate the cause.

Timken® tapered roller bearing sealed units *prevent* lubricant loss. And Timken bearings are normally lubricated with grease, which tends to stay where it belongs. By eliminating this major cause of wheel slip, Timken bearings allow railroads to utilize more fully the greater motive power of diesel-electric locomotives. And they make possible large savings in generator, motor and wheel and rail maintenance costs.

Timken tapered roller bearings eliminate the hot box problem and reduce operating and maintenance costs to a minimum. Now, doing away with the wheel slip problem is still *another* advantage of Timken bearings. A Timken Company engineer will be glad to show you how. Write, wire or phone, The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".



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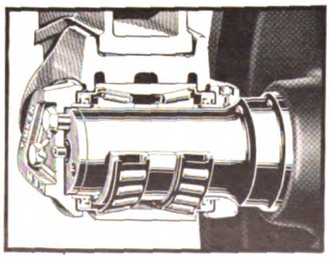
TAPERED ROLLER BEARINGS



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Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

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FR-16

The high efficiency of the Miner FR-16 Rubber Draft Gear results from years of aggressive research procedure correlated with facts (not theories) learned from service and manufacturing experience.

We provide ample initial compression with 25% of the work accomplished at one-half travel so there will be no slack action, thereby preventing worn coupler carriers, draft keys, or vital car parts. The final pressures are low, ensuring the ultimate in lading protection.

W. H. MINER, INC. CHICAGO

AIRTAC STOPS THE DIRT BUT NOT THE AIR...

this gel-type oil imparts *super* dust-catching qualities to all Panel-type Railroad Air Filters *without impairing air entry*

You get full filtration with maximum ventilation, because *Texaco Airtac's* action is selective: it stops the dirt, but not the air. There is no webbing or foaming in application.

Texaco Airtac adheres readily to filter surfaces, keeping its ability to "wick and wet" through surface collections. Under the severest operating conditions, *Texaco Airtac* will not creep or drip, even at 185°F. ambient heat, and resists weather washoff.

Texaco Airtac is easy to apply—easy to remove and economical to use. It stays in place and protects your diesels against the intake of abrasive dust.

Let a Texaco Representative show you how *Texaco Airtac* assures your diesels maximum *filtered* protection. Call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta—or write:

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TEXACO Railroad Lubricants

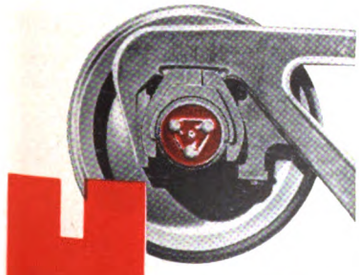
AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

Why rail freight service is better than ever today

ONE REASON IS MECHANIZED TRACK MAINTENANCE. The picturesque "gandy-dancer" with his pick and shovel has given way to amazing machines that automatically jack up rails, replace ties, drive spikes, clean and tamp ballast. Today's better tracks help heavier trains carry more freight faster and smoother.

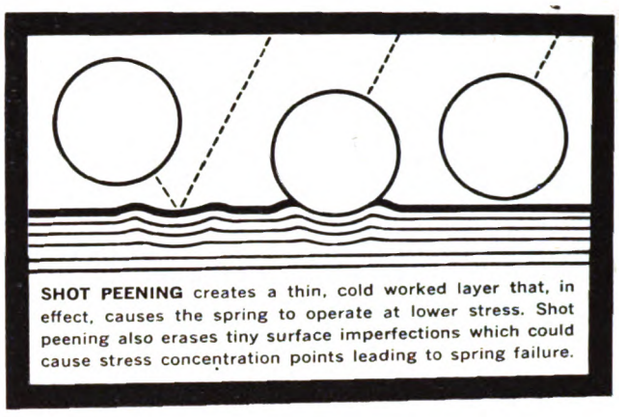
ONE MORE BIG REASON IS **HYATT HY-ROLL** BEARINGS for non-stop freight. HYATT Hy-Rolls eliminate delays for bearing inspection or lubrication because there's a 3-year lubricant supply sealed in. HYATTS have husky *straight cylindrical rollers* with extra load-carrying capacity for extra reliability, so freight cars can safely deliver the goods on speedier schedules, unhampered by costly hotboxes. That's why 27 leading lines have already adopted the HYATT Hy-Roll as a key part of their progressive modernization programs—to benefit all America with faster, more dependable freight service. Hyatt Bearings Division of General Motors, Harrison, New Jersey.



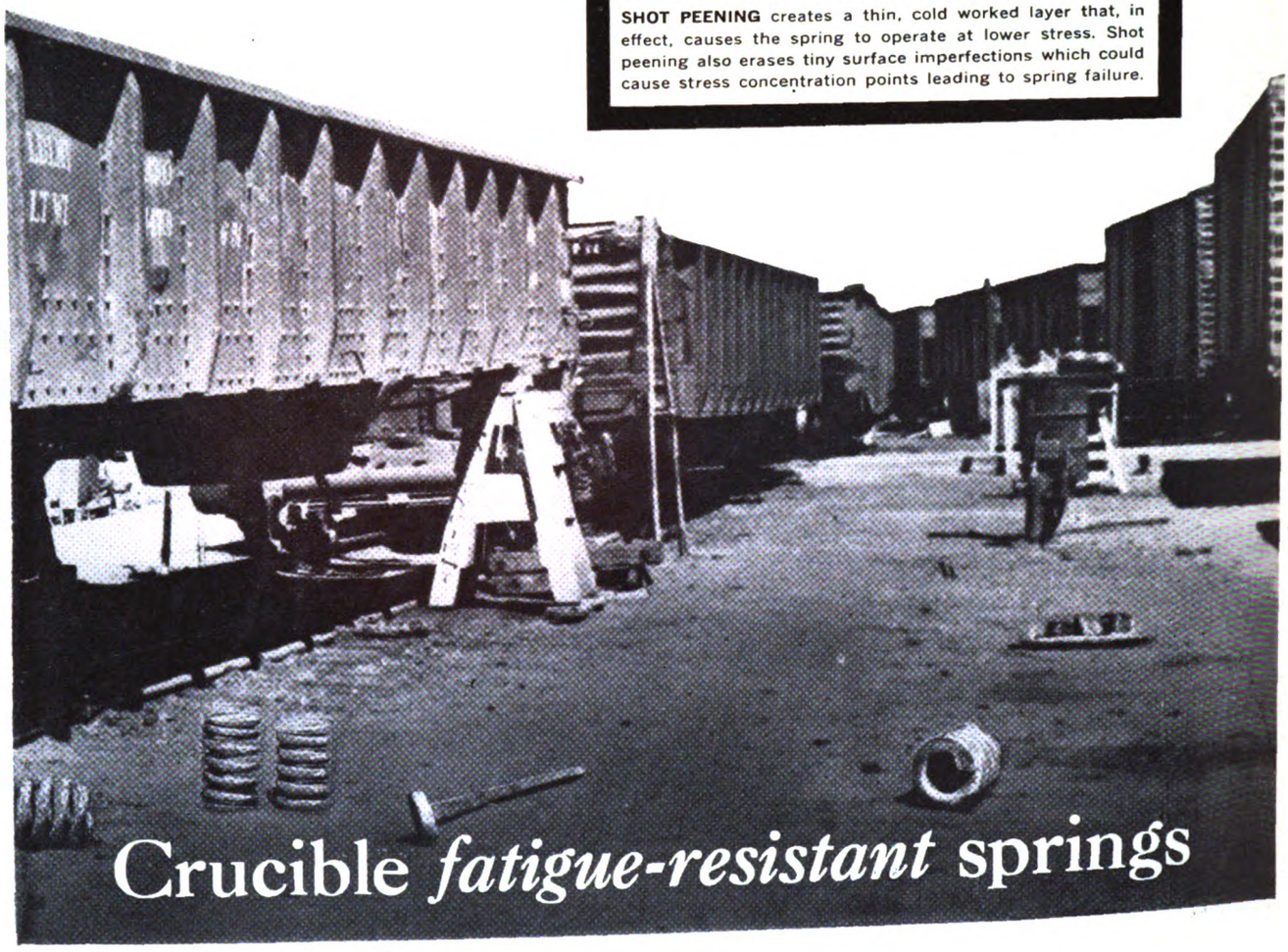
Another GM GENERAL MOTORS contribution to railroad prosperity

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

made stronger to last longer



SHOT PEENING creates a thin, cold worked layer that, in effect, causes the spring to operate at lower stress. Shot peening also erases tiny surface imperfections which could cause stress concentration points leading to spring failure.



Crucible *fatigue-resistant* springs

cut bad-order car expense

You can help keep cars off the repair tracks with Crucible's *fatigue-resistant* springs. They're single heat treated and shot peened — *made stronger to last longer* — yet they cost no more than conventional springs.

Because they last longer, Crucible *fatigue-resistant* springs reduce replacements due to spring failures—90% of which are caused by permanent set.

Fatigue-resistant springs can maintain their load-carrying capacities over longer periods because they have better hardenability, higher elastic limits and greater resistance to working stresses. Crucible ensures these qualities in every spring through strict manufacturing control from ore through final, rigorous compression tests.

Crucible single heat treated *fatigue-resistant* springs are your best guarantee of low-cost, long-lasting spring performance. For details, write for folder: *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

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NEXT MONTH:

Report on meetings AAR Mechanical Division and Electrical Section

Coated Abrasive Wheel

A new type coated abrasive wheel is doing a number of cleaning jobs at the St. Louis shop of the Missouri Pacific and has significantly reduced cylinder head cleaning time for the Frisco shop there.

This "PG" wheel is composed of hundreds of die-cut leaves of sandpaper formed into a wheel and locked into a metal hub. It is lightweight and easily used with flexible shaft machines and other portable equipment.

One of the advantages claimed for this wheel over other cleaning methods is that it cannot become filled or loaded. As the working surface of the wheel comes in contact with the work, the abrasive bond and backing are slowly worn away, so that there is always a fresh abrasive surface being presented to the work. This also accounts for a constant rate of cut, which results in a consistent finish and faster dirt, grease and carbon removal.

The Frisco shops are using "PG" wheels for removing carbon and grease deposits from diesel engine cylinder heads. After the heads are soaked in a solvent for about 5 min, the small coated abrasive wheel is used to clean and polish the tops. Countersunk areas not accessible with the wheel continue to be hand polished with abrasive cloth.

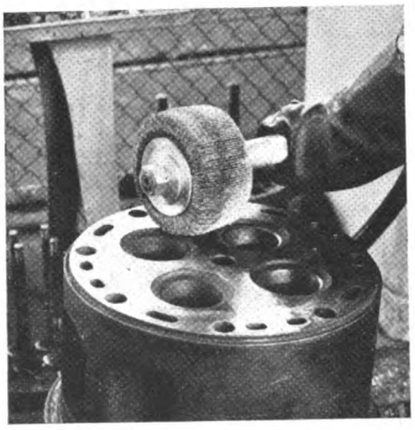
The total cleaning time with this method, including soaking, is about 12 min per head—half the time required by the previous method using wire brushes.

In addition to uniformity of finish and faster cleaning time, "PG" wheels are said to offer greater safety to the operators because the coated abrasive is securely locked in the hub mounting. Wheels used at the Frisco shops are made of aluminum oxide mineral, grit 50, on a cloth backing. The abrasive is held to the backing by a resin bond which is resistant to shock as well as high frictional heat.

On the Missouri-Pacific, small "PG" wheels have replaced wire brushes and abrasive sleeves for operations such as removing carbon deposits from the crowns of pistons. Other jobs are cleaning the bores of cylinder liners, the outside surfaces of pistons, and removing dirt and grime from the inside of roller bearing housings.

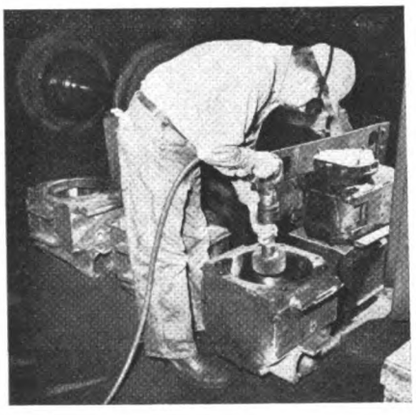
It is reported that the finish produced by the "PG" wheel is smoother and more uniform than was obtained by other methods, and the wheels offer a safer and relatively clean operation. In addition, as compared with the previous use of abrasive sleeves, there is no downtime for a change of abrasive due to loading.

Other operations for which "PG" wheels are recommended include paint and rust removal from locomotive or car surfaces. Because of the wheel's claimed ability to produce a finish up to two grits finer than a comparable grit abrasive sleeve or belt, a single grit wheel can often be used for paint removal as well as surface preparation for repainting. In instances where the surface requires grinding, the small "PG" wheels may be employed following a disc operation. *Minnesota Mining & Manufacturing Co., Dept. RLC, 900 Bush st., St. Paul 6, Minn.*

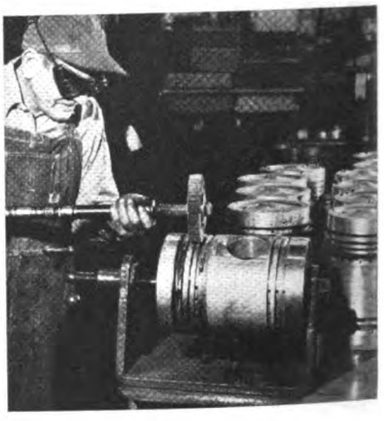


EMD cylinder head is cleaned with 6-in. dia., 2½-in. face wheel at the Frisco shop. Wheel has hundreds of leaves with aluminum oxide mineral, grit 50, on cloth backing.

Alco liners are polished at the MP shop with wheel mounted on a flexible shaft machine running at 3,400 rpm. Less pressure is required than is necessary with wire brush previously used.



Roller bearing housing has its bore polished with a grinder operating at 4,500 rpm. The grit 50 "PG" wheel, used by the MP, is said to produce finish comparable to grit 80 sleeve.



Wheel with 1-in. face and 6-in. dia. is used for cleaning the outsides of pistons at MP shop. Coated leaves are firm enough to remove material; flexible enough to follow contours.

Flexible Cushion Coupling

Paraflex, a new concept in flexible couplings for power transmission machinery, is available in capacities up to 600 hp at 900 rpm.

The coupling features a flexible tire, with synthetic tension members bonded together in rubber, clamped between two hubs which are mounted on the shafts to be coupled. Cap screws hold the tire in place between the flanges and clamp rings of the hubs. A transverse split molded into the tire permits easy installation and makes replacement possible without moving driver or driven machine. By loosening the cap screws, the tire can be easily removed and replaced.

Both hubs of the coupling are machined to take Taper-Lock bushings.

(*Continued on page 8*)

Powerful Thor air drills

Backed by 64 years of railroad know-how

HUSKY POWER FOR BIG JOBS

This series of Thor air drills in ⅜", 9/16" and ⅞" sizes puts out the really big power needed for big jobs in car and locomotive repair shops. Non-reversible speeds 300-1400 r.p.m. Reversible—200-1000 r.p.m. Grip or side throttle styles.

COMPACT POWER FOR SMALL JOBS

Thor No. 2 series air drills are light-weight (slightly over 2 lbs.), compact and extremely powerful. 600 to 14,000 r.p.m. Capacity to 5/16" in steel (No. 3 Series to ⅜" in steel). Very handy for repair or installations in passenger cars. Lever, trigger or button throttles.

Thor air drills have been "high-balling" with every major American railroad. Next time you need air tools, be sure to ask your Thor factory representative for a demonstration. He's selling tools backed by over half a century of railroad know-how. Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

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PORTABLE POWER
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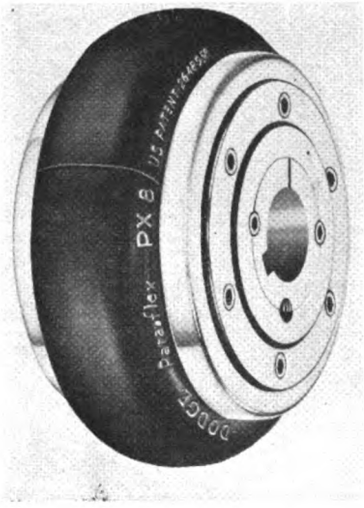
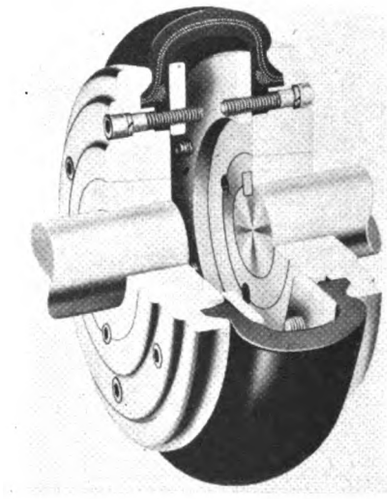
EQUIPMENT . . . NEW IDEAS — NEW USES





(*Continued from page 6*)
These give the equivalent of a shrunk-on fit on shaft and permits quick and easy application to shafts of different diameters without reboring.

According to the manufacturer, Paraflex will take angular misalignment up to four degrees, parallel misalignment up to ⅛ in., and end float up to 5/16 in. based on size of coupling and duration of conditions, or will take all of these simultaneously. It absorbs torsional vibration developed by internal combustion engines at critical points in speed range and the resilience of the flexible tire cushions shocks to a remarkable degree.

No lubrication is required since there is no metal-to-metal contact. Safety is promoted by the flush design. All cap screws are countersunk, there are no protruding parts, and the metal surfaces are finished all over.

The coupling is designed to occupy a minimum space on the shaft. *Dodge Manufacturing Corporation, Dept. RLC, Mishawaka, Ind.*

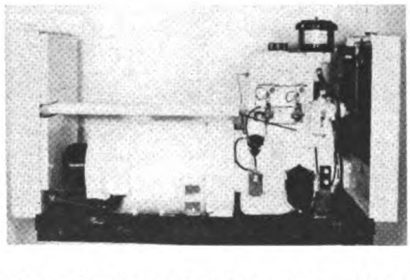
Aluminum Cleaner

Lumabrite, a solution of solvents, inhibited acid, and detergents for cleaning aluminum, is recommended for cleaning aluminum, aluminum window frames, stainless steel, or any enameled surfaces on railroad cars.

Cleaner is said to leave an invisible, inert coating, slowing up new oxidation. It gives off no toxic fumes, is nonflamable and in one operation cleans, degreases and brightens aluminum, indoors or outdoors. It is diluted with 5 to 10 parts of water, depending on its intended use, and is packed in a 6½-gal. non-returnable glass carboy. *Penetone Company, Dept. RLC, 74 Hudson ave.,* Tenafly, N. J.

Diesel Engine

A two-cylinder, four-cycle engine has been added to the FM Model 45 diesel engine line, which also includes two one-cylinder sizes. According to the manufacturer, the engine features compactness and simplicity of design, rugged durability, attractive first cost and ability to handle widely varying loads over long periods of time with ample overload capacity.



The engine is rated at two speeds—18 hp at 1,200 rpm and 26 hp at 1,800 rpm.

The removable cylinder head contains the intake valve, exhaust valve, pintle nozzle and Lanova-type combustion chamber. The combustion chamber design improves combustion characteristics throughout the full range of loading.

The alloy cast-iron cylinder liners are wet type, easily replaceable. Pistons are aluminum alloy, each equipped with three compression rings and one oil control ring. A full floating piston pin riding in a bronze bushing connects the pistons to drop forged connecting rods. The counterbalanced crankshaft is forged steel, and is fitted with precision-type, steel backed, Tri-Metal lined bearings at main and crank journals.

The fuel injection system consists of an engine driven fuel transfer gear pump, primary and secondary filters, with a Bosch injection pump and pintle nozzle for each cylinder.

The lube oil system is the wet sump type with a gear pump for pressure lubrication of all crankshaft, camshaft and rocker arm bearings. Full flow oil filtration is available. Engine cooling system includes a conventional radiator with fan and centrifugal pump. A heat exchanger cooling system is available for stationary or marine applications.

A centrifugal governor controls engine speed to within 7% of throttle setting for the entire speed range of engine.

Engine length is 29 in. over fan and flywheel housing, 25 in. wide and 40 in. in height. Weight is 800 lb.

The FM model 45 diesel engine line now offers ratings of 5, 10, 18 and 26 hp for generator sets and power units for a wide range of railroad applications such as refrigerator cars, caboose car lighting and communication system relay stations. *Fairbanks, Morse & Co., Dept. RLC, Chicago 5.*

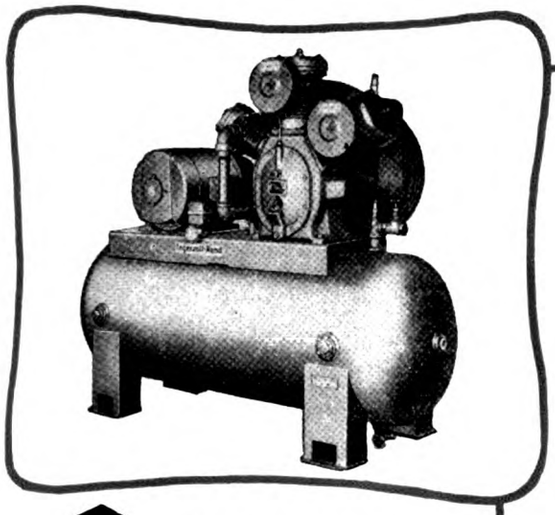
Gasket Cutter Set

This tool, for cutting round gaskets from asbestos, rubber, fibre or cork sheets, can be adapted to scribing or layout work as well. Basically a hexagonal-shaped bar with a six-sided face on which to mount the knife and point holders, the instrument provides an adjustable means to cut gaskets from 1¼ in. to 22¼ in. in diameter. Center point and knife holders can be placed on an extension bar to cut even larger radii. Designated Set B, this combination includes samples of four widely used sheet packings. *The Garlock Packing Company, Dept. RLC,409 Main st., Palmyra, N. Y.*

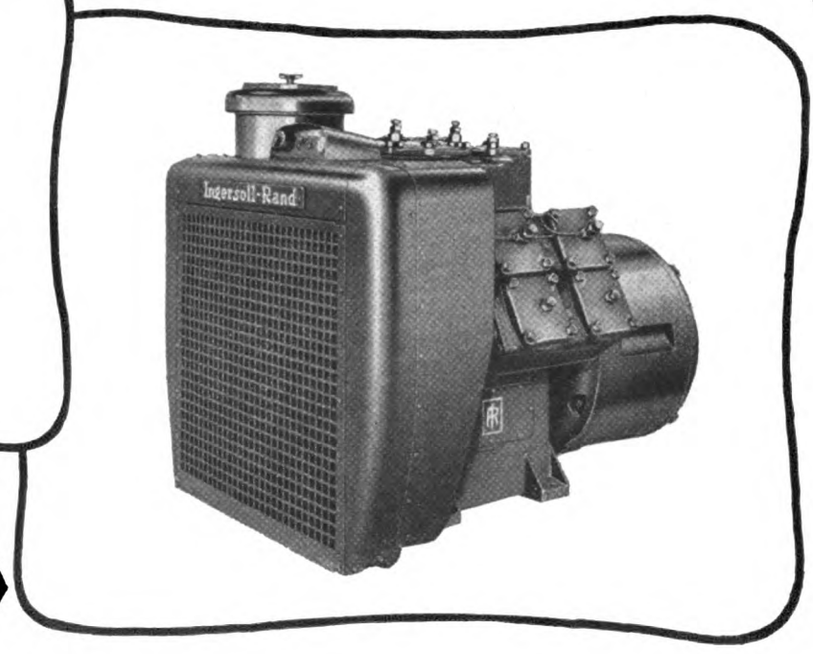
Internal Plating Tester

The Type MO Tukon Tester, is said to determine correctly the microhardness of the interior surfaces of chrome-plated metal castings. The unit is mechanically operated and load is applied under dashpot control, the speed of which may be

(*Continued on page 66*)



Type 30... A 15 horsepower unit mounted on receiver. Other units, ½ to 20 horsepower.



Type 40... This 125 horsepower Motor-compressor has built-in motor drive. Other sizes from 25 hp.

from ½ to 125 horsepower

AIR-COOLED COMPRESSORS

give you these important advantages

Wherever you need dependable, low-cost air power in the ½ to 125 horsepower range, Ingersoll-Rand air-cooled compressors offer attractive savings. Installation, operating and maintenance costs are low. These units are completely air-cooled—no water piping or jackets to clog, no water to freeze. Multi finned-tube intercoolers with forced-draft cooling keep compression efficiency high. Ask your Ingersoll-Rand representative for full information.

TYPE 30 – ½ to 20 horsepower... These compressors with their outstanding 'Balanced-V Construction' have become first choice among all who look for top operating efficiency combined with low-cost maintenance. Each combination of cylinder sizes is designed to give the most compressed air at the desired pressure; single stage units for 40, 60 or 80 psi; two-stage units for 125, 200 or 250 psi. Type 30 compressors are available as tank mounted, baseplate mounted or bare compressor units. They offer unique money saving features not found in other units.

TYPE 40 – 25 to 125 horsepower... These efficient two-stage, air-cooled units are available with three types of drive; built-in electric motor, flexible-coupled or V-belt. Dual control permits choice of constant speed or automatic start-stop control. Available for discharge pressures ranging from 80 to 200 psi. Channel Valves are efficient, quick-acting and air-cushioned for quiet operation and long service life.

Install Anywhere

- no danger of freezing
- no special foundation
- small floor space

Low-Cost Operation and Upkeep

- no cooling water required
- low maintenance
- regulation to meet requirements

Efficient Compression

- liberal valving
- large capacity intercooling
- high mechanical efficiency

Ingersoll-Rand

1-448 11 Broadway, New York 4, N. Y.

COMPRESSORS • CONDENSERS • AIR & ELECTRIC TOOLS • PUMPS • ROCK DRILLS • GAS & DIESEL ENGINES

Jersey Central 1,600-hp Alco-GE road switcher lines up beside first railroad-owned diesel-electric as this pioneer Alco-GE switcher was prepared for retirement.

First U.S. RR Owned Diesel Will Be Preserved

More than 30 years of unheralded routine service for Jersey Central 1000 ended on June 13 when this 300-hp diesel-electric switcher was retired from service. It is now taking its place with other historic locomotives at the Baltimore & Ohio museum in Baltimore. It is the second diesel to be added to the locomotive collection. The first was the pioneer streamlined Electro-Motive passenger unit built in 1937 and owned by the B&O.

JC 1000 was manufactured jointly by American Locomotive (now Alco Products), General Electric, and Ingersoll Rand in 1925. It was the first commercially produced diesel-powered locomotive built for a U. S. railroad. It weighs 60 tons. It went into service on the Jersey Central's Bronx Terminal in New York City in October 1925 and was followed shortly thereafter by two duplicate units which were purchased by the B&O and the Lehigh Valley. Approximately 100 diesel electrics of this general type and developing either 300 or 600 hp were manufactured by the three companies between 1924 and 1936.

The 1000 and the others that followed were powered by the first American lightweight high-speed engines developed by Ingersoll Rand to meet general specifications drawn up by General Electric. These four-cycle, in-line engines develop 300 hp at 600 rpm and deliver 1 hp for every 60 lb locomotive weight. One of the unique features of the engine was airless injection of fuel. This was accomplished with two opposed spray nozzles in each combustion chamber through which oil is delivered under pressure by an injection pump driven from the main shaft. One injection pump serves all cylinders and a distributor controls the fuel distribution. The engine has six cylinders, with 10-in. bore and 12-in. stroke.

General Electric developed the electric traction equipment which included generators, motors and controls. This control system—in common with virtually every diesel-electric locomotive now in use—generally follows basic principles laid down in a patent secured by Herman Lemp of General Electric in 1914. This system eliminated manual control of the generator field.

The generator for the 1000 and its successors is a 600-volt dc compound-wound commutating pole type, separately excited and directly connected with the engine. A 60-volt exciter is mounted on the same shaft as the generator. A 32-volt storage battery for lighting and control current is charged by the exciter. The locomotive has four series wound motors, each rated at 95 hp.

The unit is 32 ft 6 in. inside knuckles. The frame, car body, and trucks were built at the Alco Schenectady, N.Y., plant. The engine and traction equipment were installed at GE's Erie, Pa., works. The locomotive was then moved to the Phillipsburg, N.J., plant of Ingersoll Rand, where it was tested and demonstrated for some time prior to its delivery to the Jersey Central.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
March, 1953	2,904,228	2,692	6,077	8,769	331,192
March, 1954	2,658,757	2,196	3,637	5,833	455,813
1955					
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425
1957					
January	2,767,060	3,373	6,121	9,494	291,453
February	2,675,265	3,272	6,844	10,113	264,538
March	3,027,280	3,164	6,687	9,851	307,306

Personal Mention

Atlantic Coast Line.—*H. G. Swanson,* enginehouse foreman at Wilmington, Del., appointed general foreman.

Boston & Maine.—*Daniel A. Benson,* general manager, operating—mechanical department, appointed acting vice-president and general manager—mechanical department, in place of *Frank W. Rourke* now on leave because of illness.

Erie.—*Carl E. Maahs* appointed master mechanic at Buffalo succeeding *Francis D. Kennedy,* retired.

New York Central.—*Beech Grove, Ind.—R. H. Miller* appointed methods and production engineer. *F. E. Britton* appointed assistant general foreman.

(Continued on page 12)

TEAMED UP TO WITHSTAND THE EFFECTS OF VIBRATION

These outstanding railroads and the builders of the cars they use are upgrading their requirements for vibration resistance and safety in freight cars. The stresses of today's high speed diesel operations demand it. Elastic Stop® nuts are being specified in many areas because they will not loosen under the vibrations set up in high speed operations. Association of American Railroads Rule 101 recognizes this with the following: *"Elastic Stop nuts applied are chargeable on the basis of Rule 105 when standard to car."* Thus, this rule calls for the replacement of Elastic Stop nuts with Elastic Stop nuts.

This is important because Elastic Stop nuts reduce cost of maintenance and inspection to a minimum.

For details of the how . . . where . . . and *why* of Elastic Stop nut application to freight car vibration and maintenance reduction, write Dept. N35-723.

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road, Union, New Jersey

PERSONAL MENTION

(*Continued from page 10*)

Canadian National.—A. R. RODDA appointed mechanical instructor, Western Region, at Winnipeg.

Canadian Pacific.—RAY AUBERTIN, appointed supervisor of apprentices at Angus Shops, Montreal. AUSTIN CASE succeeds Mr. Aubertin as apprentice instructor at Ogden shops, Calgary, Alta.

Chicago & North Western.—DONOVAN R. WHITENIGHT appointed general foreman of fabrication and car construction at new freight-car shop, Clinton, Iowa. Formerly general foreman of the New York Central car shops, East Rochester, N. Y.

Long Island.—R. P. TURNBULL, mechanical engineer, Richmond Hill, N. Y., appointed master mechanic, with jurisdiction over points other than Morris Park. JACK BRANNAN, assistant general mechanical superintendent, Richmond Hill, appointed superintendent of shops for Morris Park.

Louisville & Nashville.—*Louisville, Ky. Title changes*: S. C. SNOW from superintendent of motive power to superintendent, motive power maintenance; J. S. SWAN from supervisor of locomotive operation to superintendent, motive power operation; R. F. STUCKER from manager of scheduling to superintendent, motive power production control. J. M. VAWTER, F. J. FLASPOEHLER, JR., and H. E. REYNOLDS appointed assistant superintendents motive power production control. Mr. Vawter previously engineer of planning; messrs. Flaspoehler and Reynolds, foremen in diesel shop, South Louisville.

New York Central.—B. L. STROHL, assistant mechanical superintendent, New York, appointed mechanical superintendent, succeeding E. H. WRIGHT, transferred to Syracuse, N. Y. Position of assistant mechanical superintendent discontinued.

Norfolk & Western.—C. S. WILKERSON appointed assistant enginehouse foreman at Bluefield, W. Va., succeeding P. R. CALDWELL, retired. CARL F. SMITH, gang leader at Bluefield, succeeds Mr. Wilkerson as electrical inspector at Roanoke, Va.

Pennsylvania.—J. P. CARR, appointed engineer—methods and cost control, Pittsburgh. H. A. FETTIG, general foreman, locomotive shop, Wilmington, Del., succeeds Mr. Carr as enginehouse foreman, Conway, Pa. W. F. HARVEY, engineer methods and cost control, Pittsburgh Region, appointed supervisor methods and cost control, Wilmington. P. I. HARCLERODE appointed acting master mechanic, Fort Wayne and Grand Rapids district, Northwestern Region.

Richmond, Fredericksburg & Potomac.—WALTER F. GALLAHAN appointed assistant foreman of car inspectors at Potomac Yard.

(*Turn to page 18*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of March		3 months ended with March	
		1957	1956	1957	1956
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	2.393	4.197	7.126	12.909
3—06	Total, Diesel-electric	38.094	38.383	109.265	111.042
3—07	Total, electric	744	724	2.138	2.164
3—04	Total, locomotive-miles	41.481	43.527	119.269	126.780
4	Car-miles (000.000) (M-211):				
4—03	Loaded, total	1.723	1.754	4.798	5.038
4—06	Empty, total	984	947	2.790	2.778
6	Gross ton-miles-cars, contents and cabooses (000.000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	6.881	10.428	19.607	31.324
6—02	Total in oil-burning steam locomotive trains	221	957	584	3.329
6—03	Total in Diesel-electric locomotive trains	114.301	109.901	318.505	315.934
6—04	Total in electric locomotive trains	2.365	2.152	6.543	6.465
6—06	Total in all trains	124.653	124.237	347.917	359.376
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	44.4	43.3	42.9	42.7
10—03	Empty freight car-miles	25.3	23.4	25.0	23.5
10—04	Total freight car-miles (excluding caboose)	69.7	66.7	67.9	66.2
10—05	Gross ton-miles (excluding locomotive and tender)	3,208	3,067	3,114	3,046
10—06	Net ton-miles	1.466	1.402	1.414	1.391
12	Net ton-miles per loaded car-mile (M-211)	33.1	32.4	32.9	32.6
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	63.6	64.9	63.2	64.5
14	Averages per train hour (M-211):				
14—01	Train miles	19.1	18.7	18.9	18.7
14—02	Gross ton-miles (excluding locomotive and tender)	60,645	56,863	58,237	56,370
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	47.1	47.3	45.6	46.7
17—02	All	45.3	45.5	43.9	44.9
18	Average net ton-miles per freight car-day (M-240)	954	956	914	942
20	Per cent of home cars of total freight cars on the line (M-240)	43.2	41.5	43.5	41.8

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—05	Steam	308	814	1,025	2,620
3—06	Diesel-electric	19,839	20,829	58,151	60,943
3—07	Electric	1,225	1,334	3,593	3,879
3—04	Total	21,371	22,977	62,769	67,442
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	219,087	237,022	639,605	691,079
4—09	Total in coal-burning steam locomotive trains	2,308	4,935	7,712	15,642
4—10	Total in oil-burning steam locomotive trains	47	1,665	240	6,010
4—11	Total in Diesel-electric locomotive trains	201,750	214,350	588,099	623,229
12	Total car-miles per train-mile	9.74	9.89	9.70	9.83

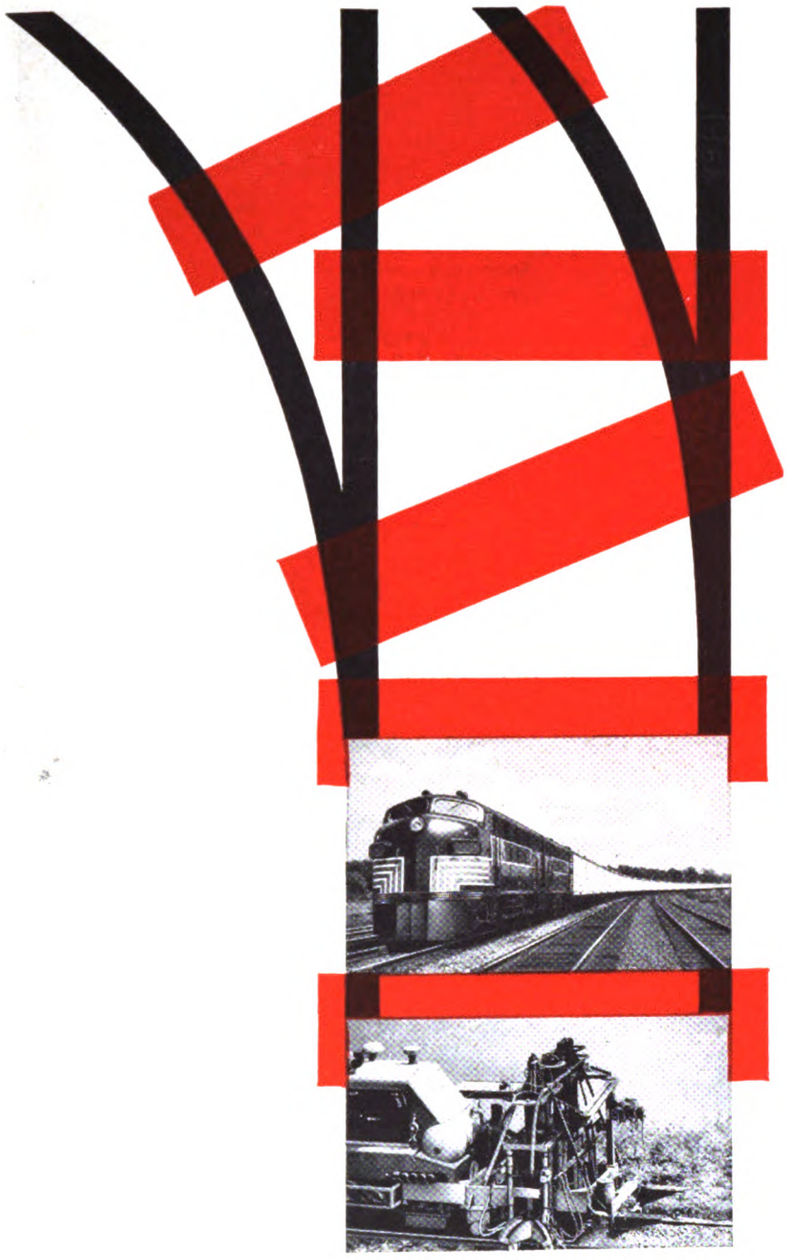
YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	162,595	251,120	499,352	753,925
1—02	Steam, oil-burning	5,495	26,983	18,745	81,633
1—03	Diesel-electric[1]	3,890,502	3,967,479	11,367,344	11,593,865
1—06	Total	4,061,266	4,248,876	11,894,250	12,438,724
2	Passenger yard switching hours:				
2—01	Steam, coal-burning	3,965	6,958	12,811	21,143
2—02	Steam, oil-burning	115	3,106	919	8,731
2—03	Diesel-electric[1]	248,751	253,540	733,996	744,452
2—06	Total	277,755	290,244	820,929	852,462
3	Hours per yard locomotive-day:				
3—01	Steam	5.5	5.8	5.7	5.9
3—02	Diesel-electric	15.4	16.2	15.6	16.1
3—05	Serviceable	15.6	16.1	15.7	16.0
3—06	All locomotives (serviceable, unserviceable and stored)	14.3	14.5	14.5	14.4
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.62	1.68	1.71	1.71
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.78	.75	.79	.76

[1] Excludes B and trailing A units

A Time-Saver Magazine

With this issue Railway Locomotives and Cars joins all other Simmons-Boardman publications in adopting a new slogan which, as now appears on the front cover, is to read "A Simmons-Boardman Time Saver Magazine." It will tend to point out, in a new way, that the articles in a technical book, such as this, have, as their primary reason for being published, the end task of bringing to readers the kind of information that will mean a real economy of time and dollars on the job. One of the disturbing things about the writing of technical articles is the fact that it sometimes takes volumes of data and notes to make a few terse paragraphs in final article form. This type of condensation is the "meat" that is behind the TIME SAVER idea. It is our job, as editors, to collect the up-to-the-minute ideas from the four corners of the country and put them in such form that they will save others TIME—and dollars of maintenance expense—in all sections of the country. Saving the reader time on his job has always been our objective. The new slogan is our guarantee that the articles of the future will be designed, in the best of modern tradition, to effect even greater time saving for our railroad readers.



HAULING A LOAD...REPAIRING THE ROAD

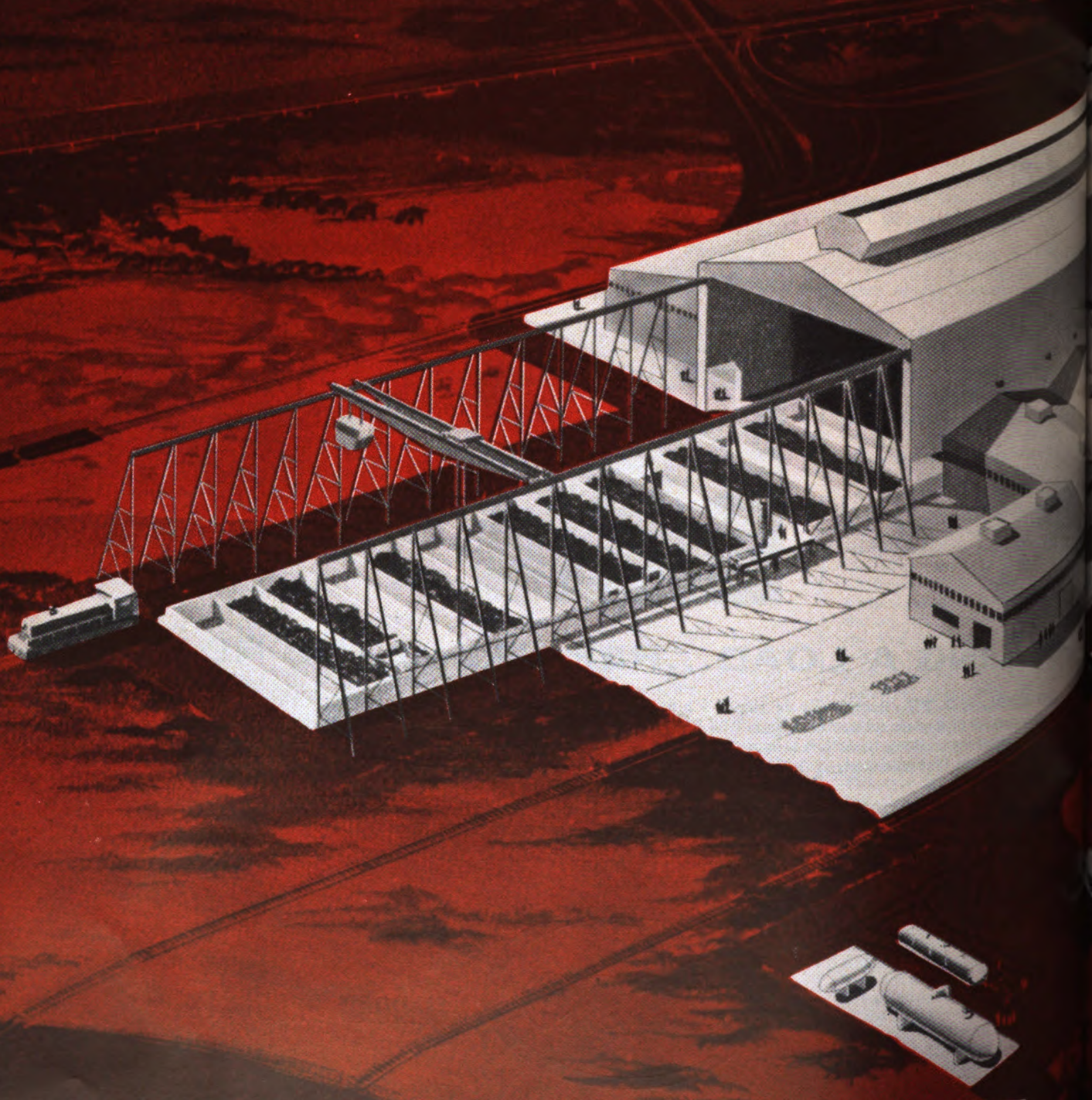
ESSO DIOL RD 77—Specifically developed for the heavy-duty engines of modern locomotives, Esso Diol RD 77 assures peak efficiency and long, trouble-free engine performance—high standards that mean extra lubrication economy.

ESSOLUBE HD—For smaller, high-speed diesel engines in maintenance-of-way equipment, Essolube HD detergent-type motor oil provides dependable engine protection . . . cuts oil consumption with long-lasting lubrication.

Skilled Esso technicians are ready to analyze your petroleum needs and recommend the best fuel or lubricant for your diesel equipment. For information or technical assistance, call your local Esso office, or write: Esso Standard Oil Company, Railroad Division, 15 W. 51st Street, New York 19, N. Y.

ESSO RAILROAD PRODUCTS

The Plant that ACCEPTANCE built!



GRIFFIN WHEEL PLANT · COLTON, CALIFORNIA

Complete plant and office facilities to meet the needs of West Coast railroad shops.

GEARED TO PRODUCE
RPU
MEMBER

The proof of a new product is in its *acceptance*—and to date the new Griffin EQS steel wheel is rolling under the freight cars of 67 railroads and private car lines in the United States and Canada.

Griffin's answer to this ready acceptance by the railroads of the new EQS wheel is the construction of this newest and most modern steel wheel plant at Colton, California, scheduled for completion early in 1957.

NOW IN PRODUCTION

Longer wheel life—better wear—greater uniformity and closer tolerances. Find out how these advantages of the new Griffin EQS give you a higher return on your wheel investment.

GRIFFIN EQS

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Give the "green" to **GRIFFIN** *and watch your costs go down!*

SURER, SAFER, SIMPLER CONTROL

give

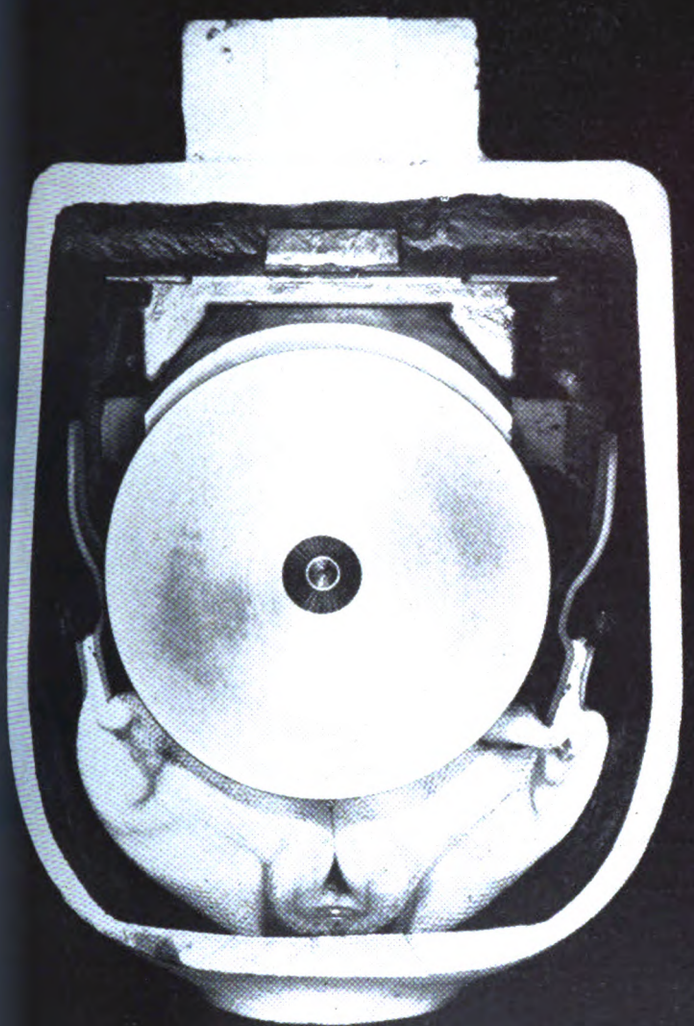
Positive Shift Prevention! Built-in fiber retainers prevent both endwise shift and shift from journal rotation. Pad resilience holds retainers against side of box, away from journal. One universal style for use in boxes with or without retaining ribs.

Far Better Wicking Action! New heavier cotton weave provides superior wicking action. Cover is woven as a single tube, eliminating all possible seams from the wicking path. The twin design also provides for equalization of the oil level in the journal box through a channel at the center.

Improved Resilience! Twin inserts are made of specially molded foam neoprene, compounded to our specifications. This provides excellent set resistance and oil absorption properties, and is designed for improved resilience.

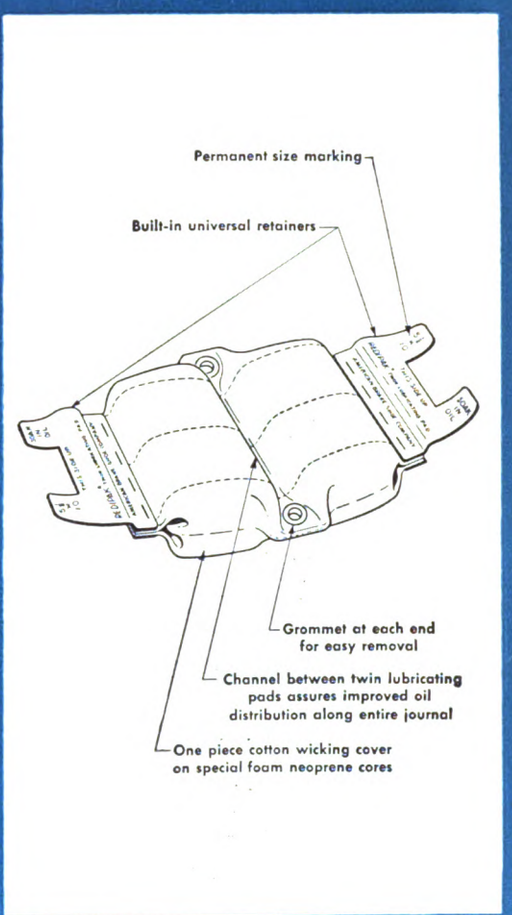
Superior Oil Distribution! New twin design assures improved oil distribution along the entire length of the journal.

OF THE HOT BOX PROBLEM!



For boxes with or without retaining ribs, fiber plates integral with the new Redipak twin pads engage the stop columns, preventing both endwise and rotational shifting.

COMPARE THESE FEATURES OF REDIPAK TWIN PADS



Here it is . . . the new, improved Redipak twin lubricating pad! This latest triumph of American Brake Shoe's bearing research retains the simplicity, economy, and durability of the original model—yet achieves new standards of dependable, all-year-round lubrication!

This new Redipak twin lubricating pad is even easier to install, too. Sturdy fiber retainers keep it securely in position . . . whether or not the box is equipped with retaining ribs.

Try out this new Redipak twin lubricating pad and see for yourself how it improves lubrication!

AMERICAN Brake Shoe COMPANY

RAILROAD PRODUCTS DIVISION

530 Fifth Avenue • New York 36, N.Y.

A-4542

Supply Trade Notes

AMERICAN BRAKE SHOE COMPANY.—*Thomas W. Russell, Jr.*, general purchasing agent, has been elected vice-president.

■

YOUNGSTOWN STEEL DOOR COMPANY.—*Emmett P. Dowling* has been elected president and chief executive officer, succeeding *John P. McWilliams*, who has been reelected chairman.

■

GENERAL MOTORS DIESEL LIMITED.—A new single-story, concrete and asbestos building, 120 ft long and 50 ft wide, has recently been placed in service at London, Ont., for the testing of GM locomotives and mobile power cars. Four road locomotives can be housed at one time. Three work levels permit inspection of all parts of a locomotive.

■

AIR REDUCTION COMPANY.—Plans are under way at Lorain, Ohio, for a $3,000,000 expansion that will more than double production facilities for gaseous and liquid oxygen. Construction is expected to take about one year.

■

WAUKESHA MOTOR COMPANY.—*Newton H. Willis*, manager of the Railway Division, has been named a vice-president of the company.

Mr. Willis received a Bachelor of Science Degree in mathematics and physics from Carroll College in 1928 and a similar degree in mechanical engineering in 1930 from the University of Wisconsin College of Engineering. He started his career with Waukesha in 1930 as a design and engineering draftsman. In 1933 he began work with the newly formed Railway Division, then known as the Refrigeration Division, progressing to the position of general manager. Mr. Willis is a licensed professional engineer.

■

FAIRBANKS, MORSE & CO.—*V. H. Peterson*, vice-president, engineering, has been appointed vice-president, sales, succeeding *Robert H. Morse, III*, who has become vice-president, budgets and planning. *John C. Elmburg* has been appointed general sales manager.

■

CONTINENTAL BEARING RESEARCH CORPORATION.—The *Continental Bearing Research Corporation*, 489 Fifth ave., New York, has been formed to analyze, design and supply bearings, in production or semi-production quantities, for specific uses, as well as for use in water pumps, gas turbines, etc., which operate with low-viscosity lubricants, such as air and water. Design studies are also undertaken on a project or consulting basis. *Stanley Abramovitz*, formerly with the Franklin Institute, directs engineering activities.

■

COOPER-BESSEMER CORPORATION.—*Ralph L. Boyer* has been elected vice-president and director of engineering, succeeding *Hewitt A. Gehres*, retired.

E. P. Dowling

Harrison Taylor

T. W. Krueger

C & D BATTERIES, INC.—*Wallace M. Schleicher*, formerly general sales manager for Edison Storage Batteries, has been appointed manager, motive power and railroad sales, for C & D at Conshohocken, Pa. *Harrison Taylor*, formerly staff engineer in the general offices service division of the Electric Storage Battery Company, has joined the Headquarters Service Division of the engineering department of C & D.

■

ARMCO STEEL CORPORATION.—*Harry L. Gaddis* has been appointed superintendent of the railroad wheel works department of the Butler, Pa., works.

DUFF-NORTON COMPANY.—*T. W. Krueger*, sales manager, Jack Division, has been appointed sales manager, in charge of all sales for the Jack and Coffing Hoist Divisions.

■

UNION CARBIDE CORPORATION, LINDE COMPANY.—*William M. Haile* has been appointed president of Linde. Mr. Haile was previously a vice president.

UNION CARBIDE DEVELOPMENT COMPANY.—*R. E. Cornwell*, vice-president, has been appointed president.

Obituary

LEON A. DOUGHTY, president of C & D Batteries, Inc., died suddenly on May 18.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JUNE ISSUE

FREIGHT CARS

Road and builder	*No. of Cars*	*Type of car*	*Cap., tons*	*Other detail*
ALASKA:				
General American	50	Tripple hopper	70	Cost, $486,824; delivery to begin second quarter 1958.
ATLANTIC COAST LINE:				
Company shops	9	Flat	125	Approximate unit cost, $30,000. Two delivered; others to be completed in September or October.
DELAWARE & HUDSON:				
Bethlehem Steel	1,000	Hopper	70	200 to be delivered in each of next five years.
FLORIDA EAST COAST:				
Thrall Car	6	Flat	50	Unit cost, approximately $8,100. For August delivery.
GRAND TRUNK WESTERN:				
Pullman-Standard	300	Box	—	For fourth quarter 1957 delivery.
ACF Industries	100	Triple hopper	70	For fourth quarter 1957 delivery.
Magor Car	100	Flat	—	For first quarter 1958 delivery.
International Ry. Car	15	Cabooses	—	Unit cost, $14,687. Delivery expected fourth quarter 1957.
NORFOLK & WESTERN:				
International Railway Car	15	Cabooses	—	For first quarter 1958 delivery.
SACRAMENTO NORTHERN:				
ACF Industries	20	Drop bottom gondola	70	For first quarter 1958 delivery.
TIDEWATER SOUTHERN:				
Pacific Car & Foundry	10	DF box	—	50-ft. insulated; equipped with roller bearings. For fourth quarter 1957 delivery.
ACF Industries	5	Drop-bottom gondola	70	For first quarter 1958 delivery.
UNION PACIFIC:				
General American	50	Tank	—	
UNION TANK CAR:				
Company shops	10	Tank	—	8,000-gal.
	13	Tank	—	10,000-gal. 23 cars for delivery late 1957 and first quarter 1958.
WESTERN PACIFIC:				
Pacific Car & Foundry	100	DF box	—	Insulated and equipped with roller bearings.
ACF Industries	75	Drop-bottom gondolas	70	

PASSENGER-CAR ORDERS

Road and builder	*No. of Cars*	*Type of car*	*Other detail*
CANADIAN NATIONAL:			
Budd Co.	1	RDC-1	Estimated cost of three cars, $540,000.
	2	RDC-3	

INQUIRIES AND NOTES

FREIGHT CARS:

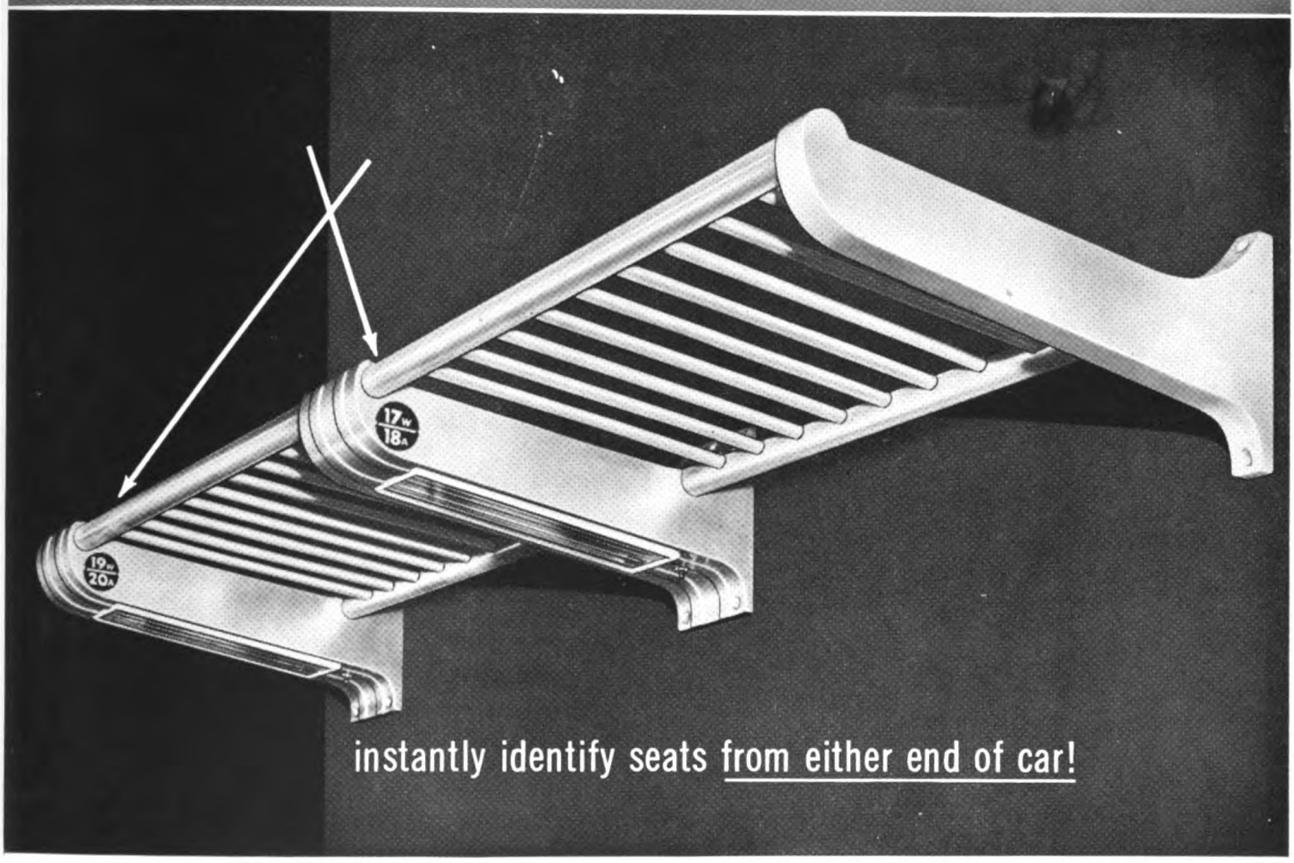
Great Northern.—Directors have approved plans to build 1,000 steel box cars and 50 50-ton flat cars and to install steel sides on 500 wood-sheathed box cars in 1958. Cost, $10,000,000.

SPECIAL:

Canadian National.—Ordered 49 steam generator cars, Canadian Car Company, Cars, to be delivered late in 1957, will be equipped with two steam generating units, a diesel-generator set, water tanks with total capacity of 3,000 gal, and 500-gal fuel tanks.

new

luggage rack with illuminated seat numbers



instantly identify seats from either end of car!

Now, with illuminated seat numbers located at the end of the brackets and directly over each seat, new convenience is added to the tested and proved features of Adlake Luggage Racks. A glance tells the passenger "This is your seat!"

Safe and sturdy, built to take abuse and loads. Sweeping in line, to harmonize with modern railroad car design, and finished for attractive appearance. No wonder Adlake Luggage Racks are the choice of railroads all over America!

For information or assistance in luggage racks, and facts about Adlake hardware for your cars, write us at 1152 N. Michigan, Elkhart, Indiana.

Adlake
THE ADAMS & WESTLAKE CO.
100th ANNIVERSARY
1857-1957

The Adams & Westlake Company

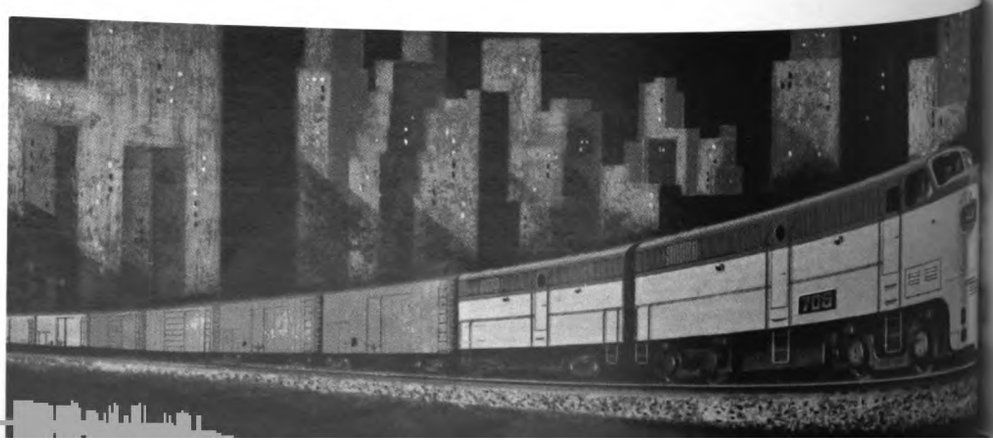
Established 1857 • ELKHART, INDIANA • New York • Chicago

Manufacturers of ADLAKE Specialties and Equipment for the Railroad Industry.

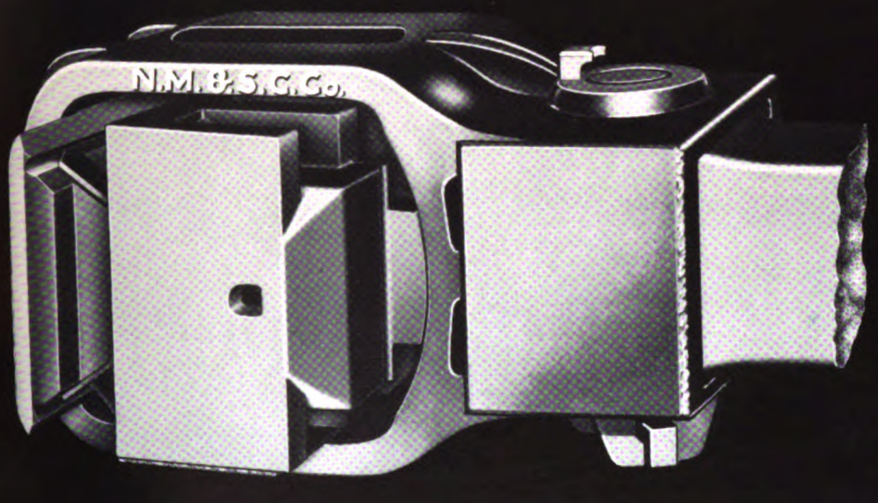
There's Improved Railroading with National Specialties

EXAMPLE:

National Rubber-Cushioned D



Draft Gears for Road Locomotives



DRAFT GEARS

COUPLERS

YOKES

FREIGHT TRUCKS

JOURNAL BOXES

Over 9 out of 10 diesel and gas turbine road locomotives are equipped with National Rubber-Cushioned Draft Gears. That's because National Rubber-Cushioned Draft Gears, with exclusive shear-compression principle, give *continuing* performance so that equipment availability goes up.

When you think of rubber-cushioned draft gears, remember this important fact: Since 1937, over 40,000 National Rubber-Cushioned Draft Gears have given over *200 billion* miles of satisfactory service. *No other manufacturer can match National's record.*

AA-4693

NATIONAL MALLEABLE and STEEL **CASTINGS COMPANY**

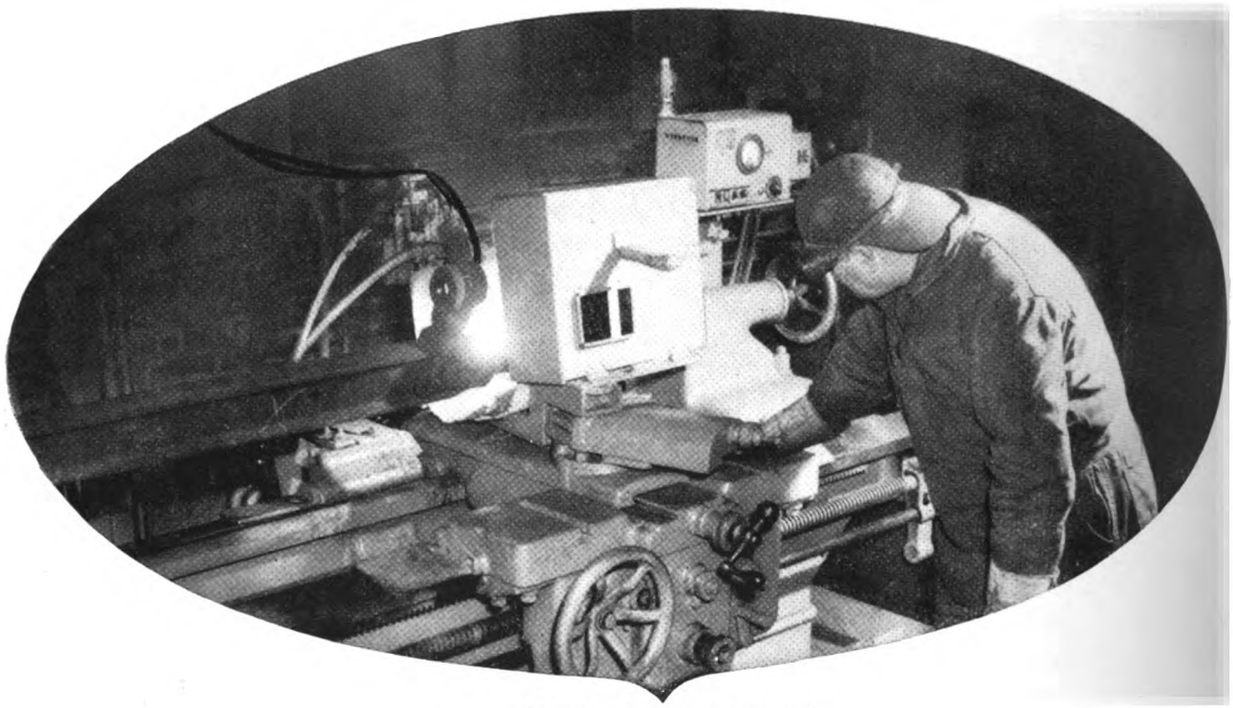
RAILWAY DIVISION HEADQUARTERS
CLEVELAND 6, OHIO

INTERNATIONAL DIVISION HEADQUARTERS
CLEVELAND 6, OHIO

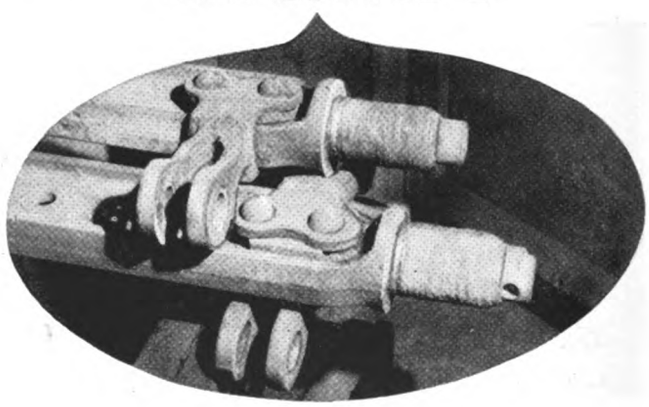
CANADIAN SUBSIDIARY: NATIONAL MALLEABLE & STEEL CASTINGS COMPANY
OF CANADA, LTD. • TORONTO 1, ONTARIO

ESTABLISHED IN 1868

GEARED TO PROGRESS
P
R I



REBUILD WITH SIGMA ... AND SAVE!



The New York Central System saves more than $5,000 a year by using Sigma welding to rebuild passenger car brake beams. Previously, it took 30 minutes to rebuild trunnions on a single brake beam by manual arc welding. Now, the same operation is completed in only 6 minutes —thanks to the speed and efficiency of automatic Sigma welding. This greater speed provides savings of more than one dollar for every brake beam rebuilt.

Sigma welding's combination of automatic wire feed and argon gas shielding is simplifying and speeding a wide range of jobs in shops across the nation. Both manual and automatic mechanized installations are easy to operate and maintain.

Sigma welding is only one of many modern methods developed by LINDE to help railroads save time and money. For more detailed information, call your local LINDE representative or write for free booklet F-7942. Do it today!

The familiar symbol of over forty years' service to the railroad industry.

RAILROAD DEPARTMENT

LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

30 East 42nd Street, New York 17, New York

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

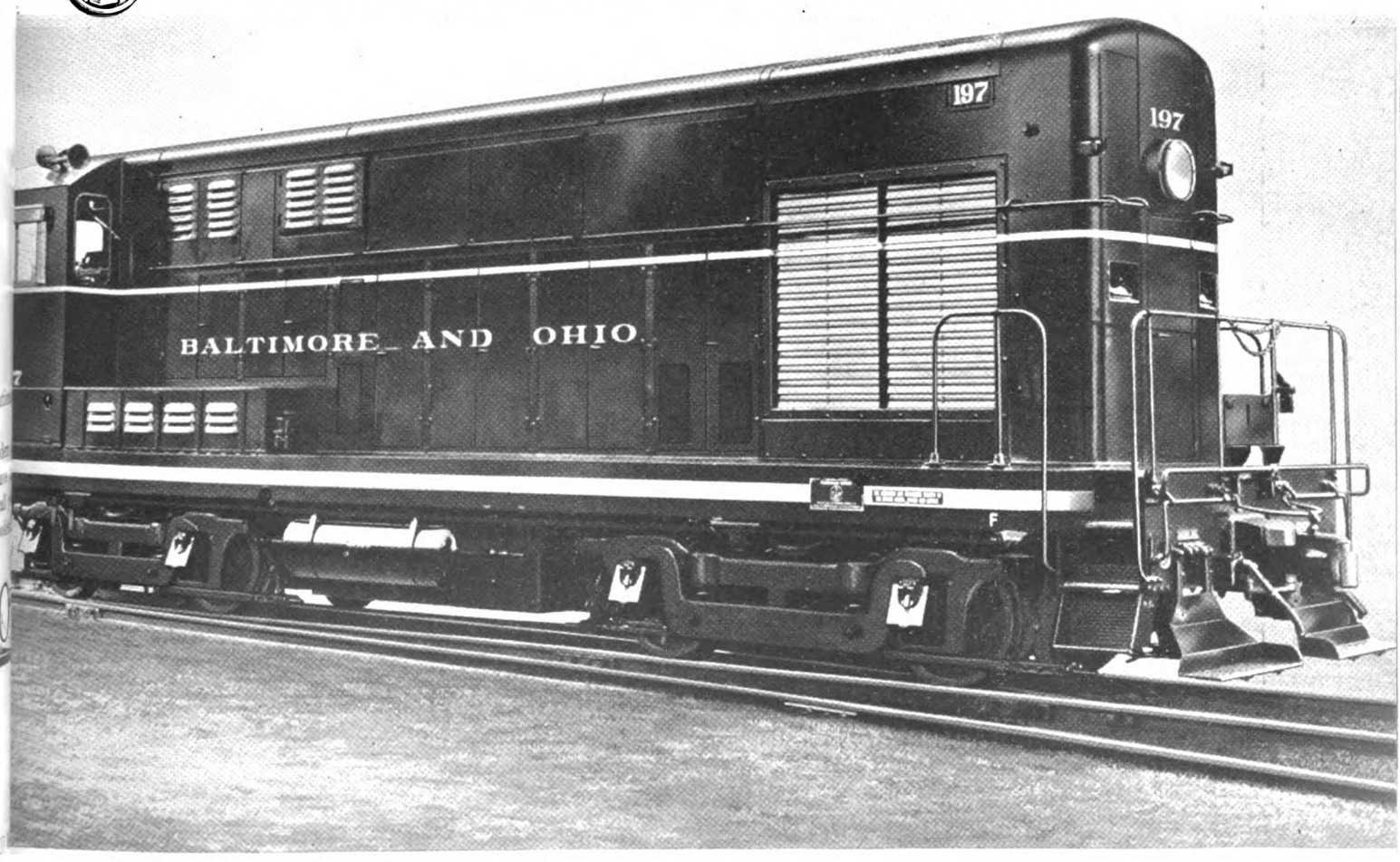
ANOTHER REPEAT ORDER

Baltimore and Ohio R. R.

adds 10 more 1200 and 1600 hp.

Fairbanks-Morse locomotives

...DEPENDABLE POWER FOR MODERN RAILROADING



Fairbanks, Morse & Co.,
600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS

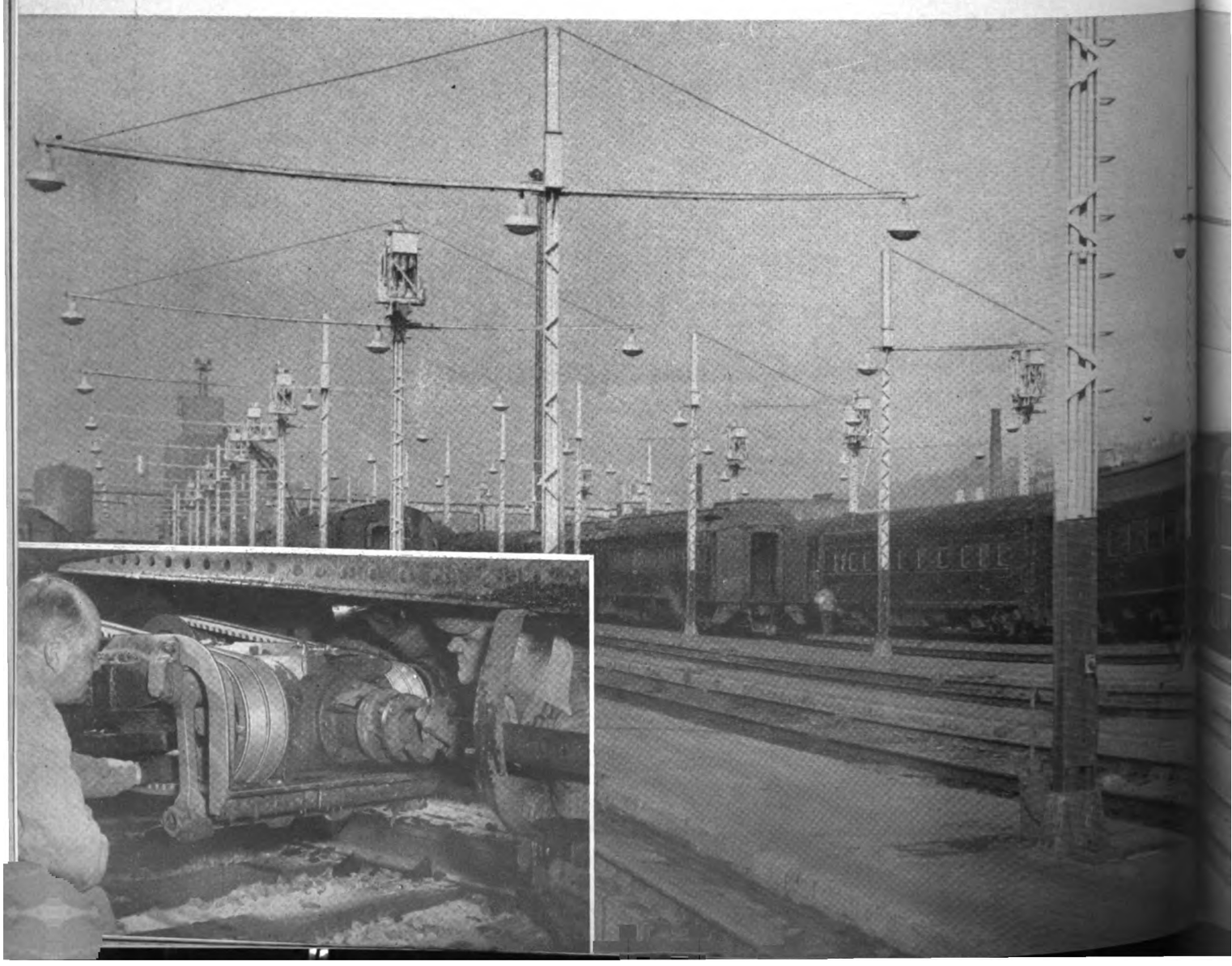
You Need Low Cost, Dependable Electric Power

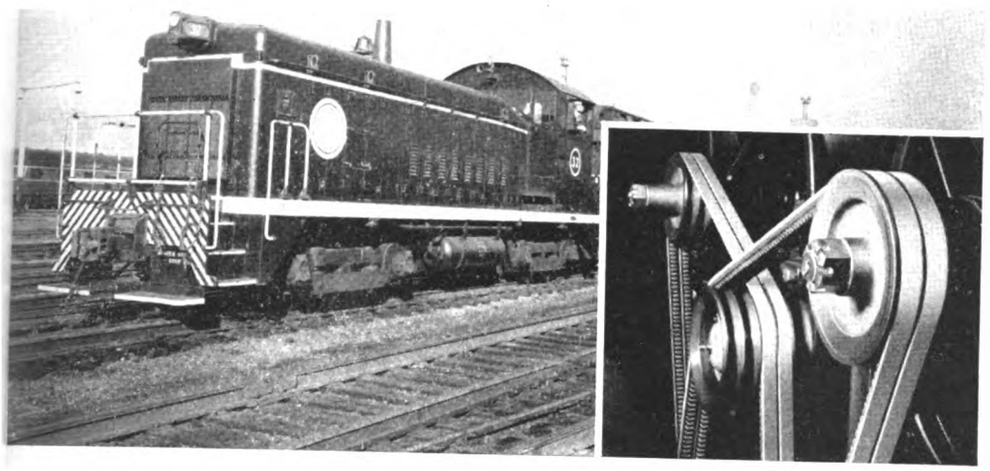
. . . And Get It—Efficiently, Economically—With Dayton V-Belt Generator Drives

For complete passenger car electric service, for diesel engines, for train communications systems, today's most dependable, most easily maintained source of power is the Dayton Railway V-Belt Drive. In all weather and all climates, under all road conditions, on sharpest curves and on the straightaways, Dayton Railway Connector Belts and Endless Cog-Belts* perform outstandingly!

Crews can quickly, easily check an undercar Dayton V-Belt Drive — making sure of uninterrupted lighting, heating, air conditioning. Dayton V-Belts can be changed on the tracks without costly dismantling of equipment. (Inset: Dayton Field Engineer also inspects undercar drive as part of regular preventive maintenance service.)

To help you reduce costs further while improving V-Belt life and efficiency, Dayton Field Engineers are always available in any part of the country to serve you with the best in technical knowledge and V-Belt equipment. Write Dayton Rubber Company, Railway Division, Dayton 1, Ohio, for complete information or to contact a Dayton Field Engineer.





When your Dayton Field Engineer specifies Dayton V-Belts, he assures you the best possible V-drive operation. Dayton V-Belts are on more cars than all other makes of V-Belts and are specified as original equipment on 90% of all new Diesel locomotives.

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, Dallas, Dayton, Moline, New York, San Francisco and St. Louis

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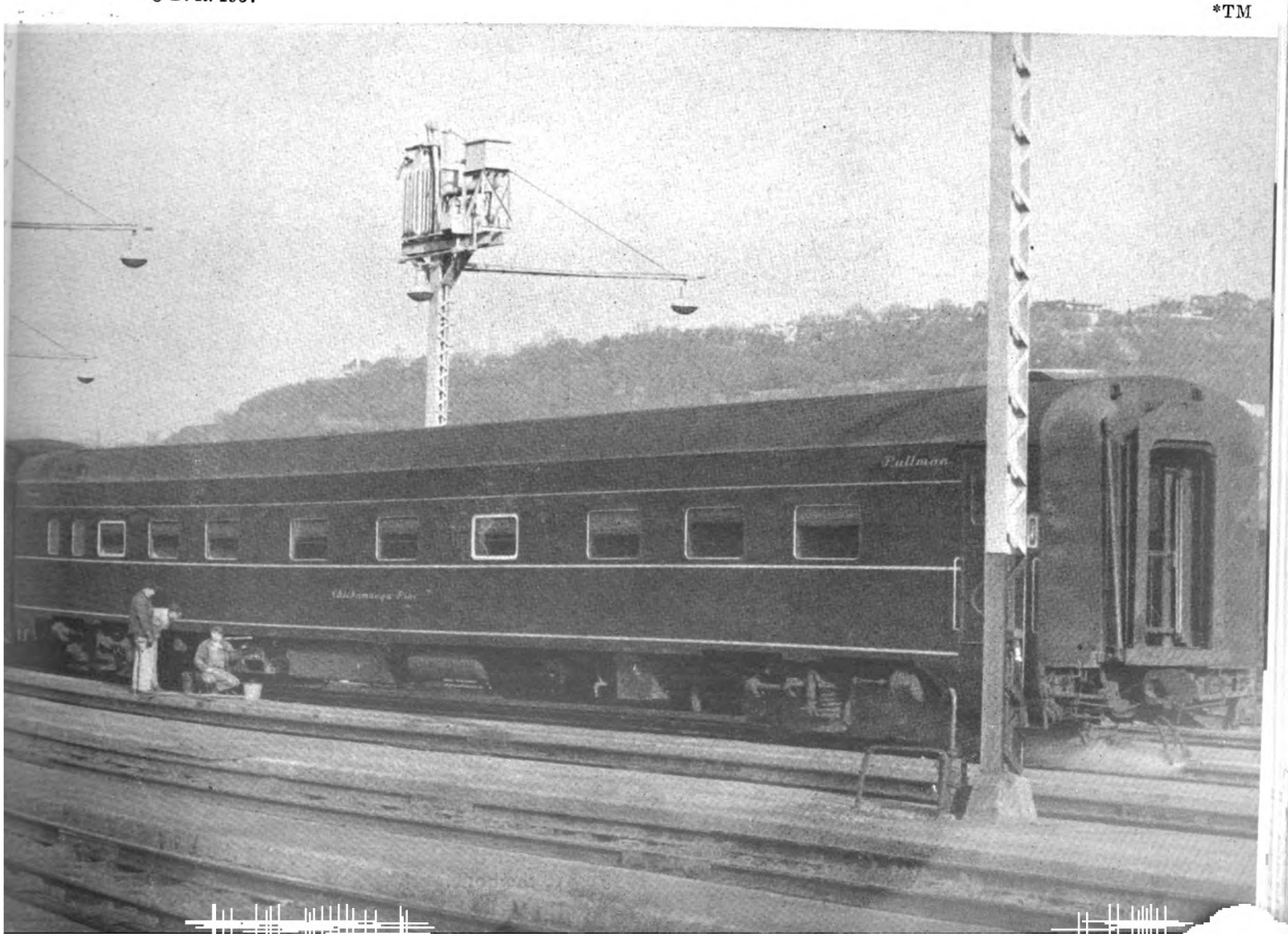
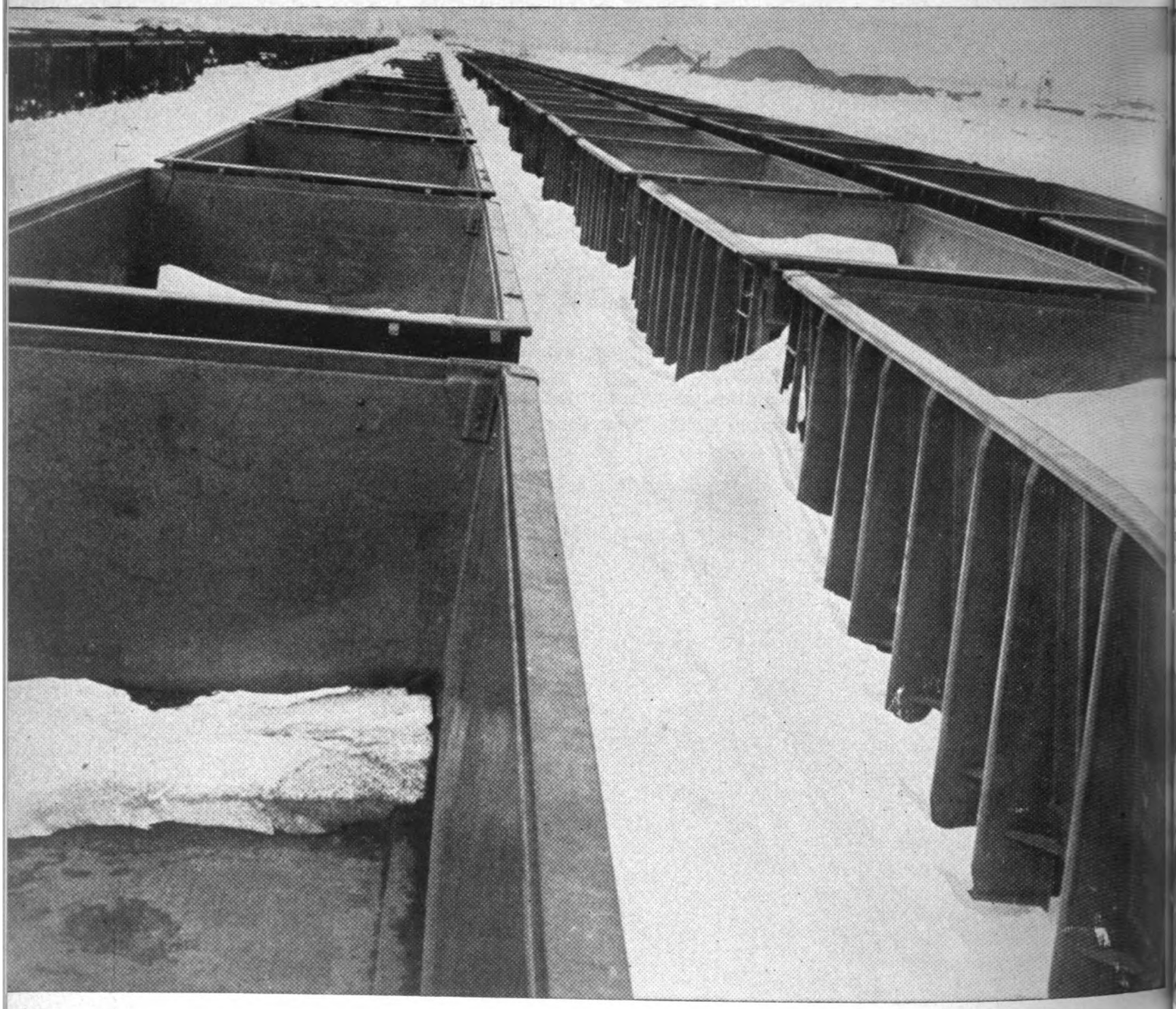
*TM



since '53 - 200,517,000*

North Shore and

*As of April, 1957



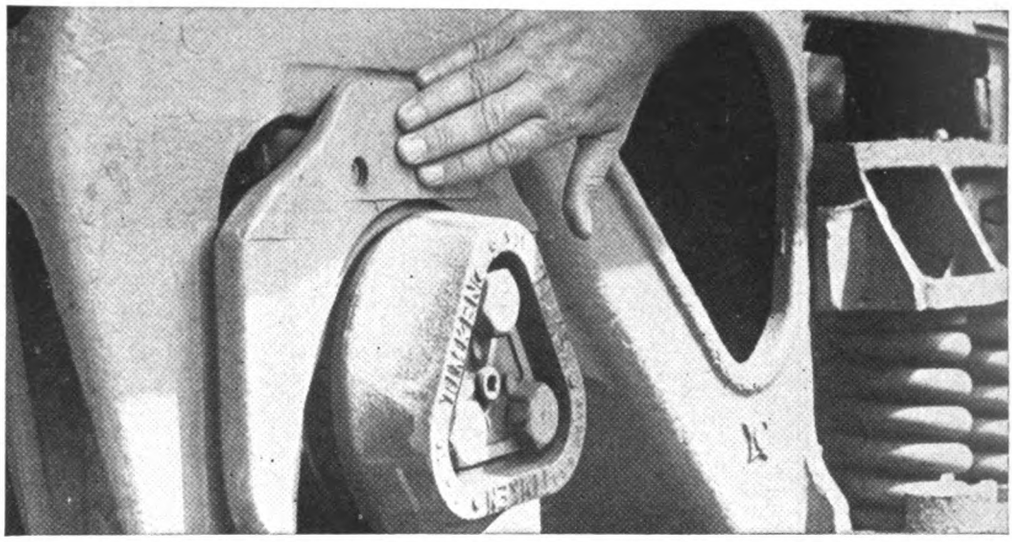
1. READY TO GO AT 50 BELOW — Quebec, North Shore and Labrador ore cars spend five months a year buried in snow and at temperatures as low as 50° below zero. Come spring, they have to be ready to roll, hauling ore from the iron mines at Schefferville, Labrador, to Sept Iles, Quebec, docks. Over 350 miles of the toughest railroad country in the world.

That's why QNS&L, after an exhaustive engineering study, decided in 1951 to put all of their original 2,000 95-ton ore cars on Timken® tapered roller bearings. (See reprint of 1953 advertisement—top.) Snow drifts like these and extreme cold would make major attention a must with friction bearings. With Timken bearings, sealed in grease lubrication, the cars can roll as soon as the snow is removed.

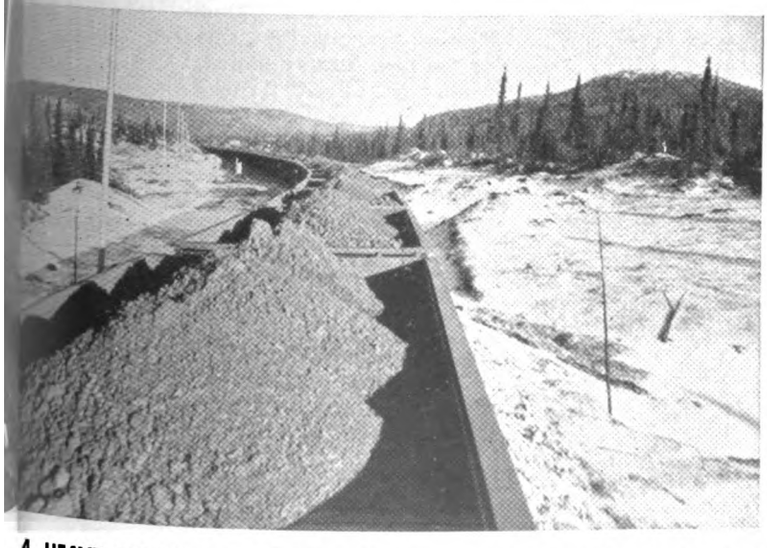
Since 1951, QNS&L has added 975 more ore cars and 28 other types of freight cars on Timken bearings. "Roller Freight" ore cars on this wilderness railroad have now rolled 200,517,000 car-miles without a single hot box. And they've helped the QNS&L pare operating and maintenance costs to the bone.

00r-miles without a hot box on Quebec, abrador 95-ton "Roller Freight" ore cars

2. NO PLACE FOR A HOT BOX—Hot boxes are trouble enough in settled areas where repair and removal facilities are close at hand. In remote regions like this, hot boxes could seriously interrupt operations. Another big reason why QNS&L turned to Timken bearings to beat the hot box problem—No. 1 cause of freight train delays.

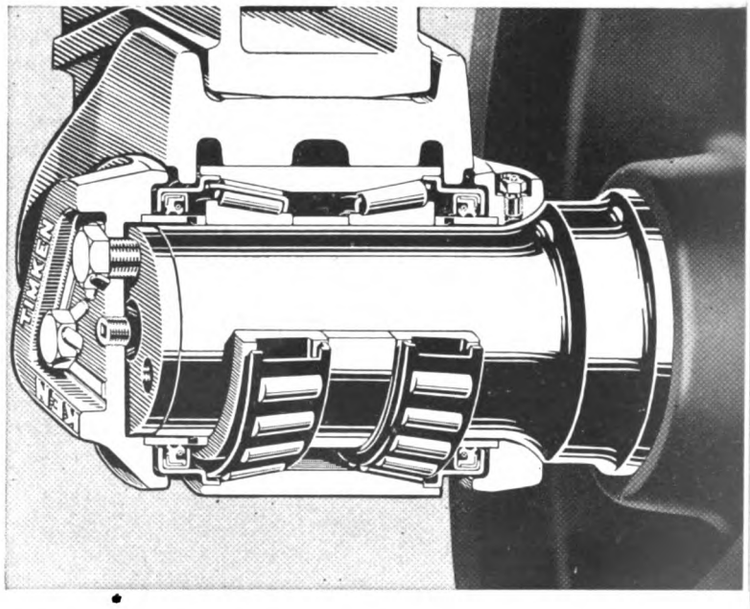


3. TOUCH AND GO INSPECTION CUTS DELAY—With friction bearings, an inspector must stop at every journal box, open the lid, poke around inside to make sure everything's in place, oil 3 out of 4. By contrast, Timken bearings (above) need just a touch of the hand—a check for temperature—as the inspector walks the length of the train. And Timken bearings can go three years without adding lubricant—cut cost of lubricant up to 95%.



4. HEAVY LOADS NO PROBLEM—Even with heavy loads on new track, the QNS&L ore cars meet schedules, exceed seasonal quotas. Because Timken bearings are tapered, they take the heavy loads from any direction—actually *roll* the load. Rollers can't skew or scuff. There's no lateral movement to force out lubricant. Operating and maintenance costs are cut to the bone.

"Roller Freight" is really rolling. 58 railroads and other freight car owners now have over 23,000 freight cars on Timken bearings in service or on order—over ⅓ of them in interchange. The Timken Roller Bearing Company, Canton, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



TIMKEN

TRADE-MARK REG. U. S PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

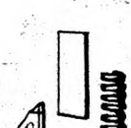
SAVINGS FACTS:

FACT No. 1

Barber Stabilized Trucks save maintenance costs. When it's necessary to service *Barber* parts, the friction castings and side springs are removed and replaced *5 to 10 times faster* than those of any competitive truck.

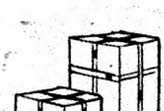
FACT No. 2

Barber Stabilized Trucks protect your equipment. Their unique system of suspension absorbs and eases . . . by friction . . . the destructive vertical shocks and bouncing as well as the lateral forces which usually result in dangerous nosing and swivelling.



FACT No. 3

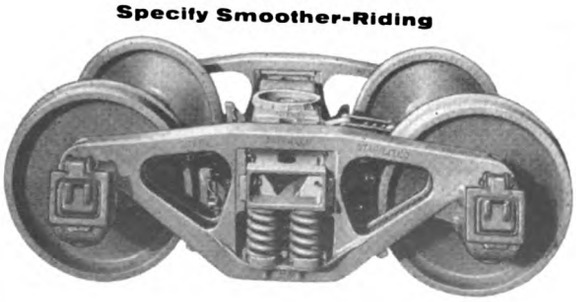
Simplicity and durability in action! Barber's three sturdy parts . . . the special *friction shoe*, the *wear plate* and the *side spring* . . . can be inspected at a quick glance. Fewest possible working parts require less attention, do a better job.



FACT No. 4

Barber Stabilized Trucks save on damage claims. They provide *the* smoother ride for ladings. Simply stated, Barber Stabilized Trucks provide variable friction for variable loads. No over-solid spring blows! For smoother-riding freight cars, insist on Barber.

Specify Smoother-Riding

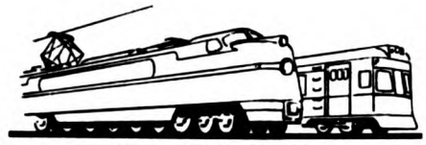


BARBER

Stabilized Trucks

Standard Car Truck Company
332 S. Michigan Ave., Chicago 4, Illinois
In Canada
Consolidated Equipment Co., Ltd., Montreal 2

DIESELS



ELECTRICS

MU CARS

ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

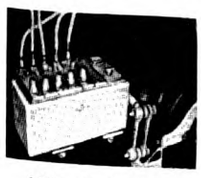
What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.

FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange Lubricators

Safety Valves

Fuel Tank Sight Gages

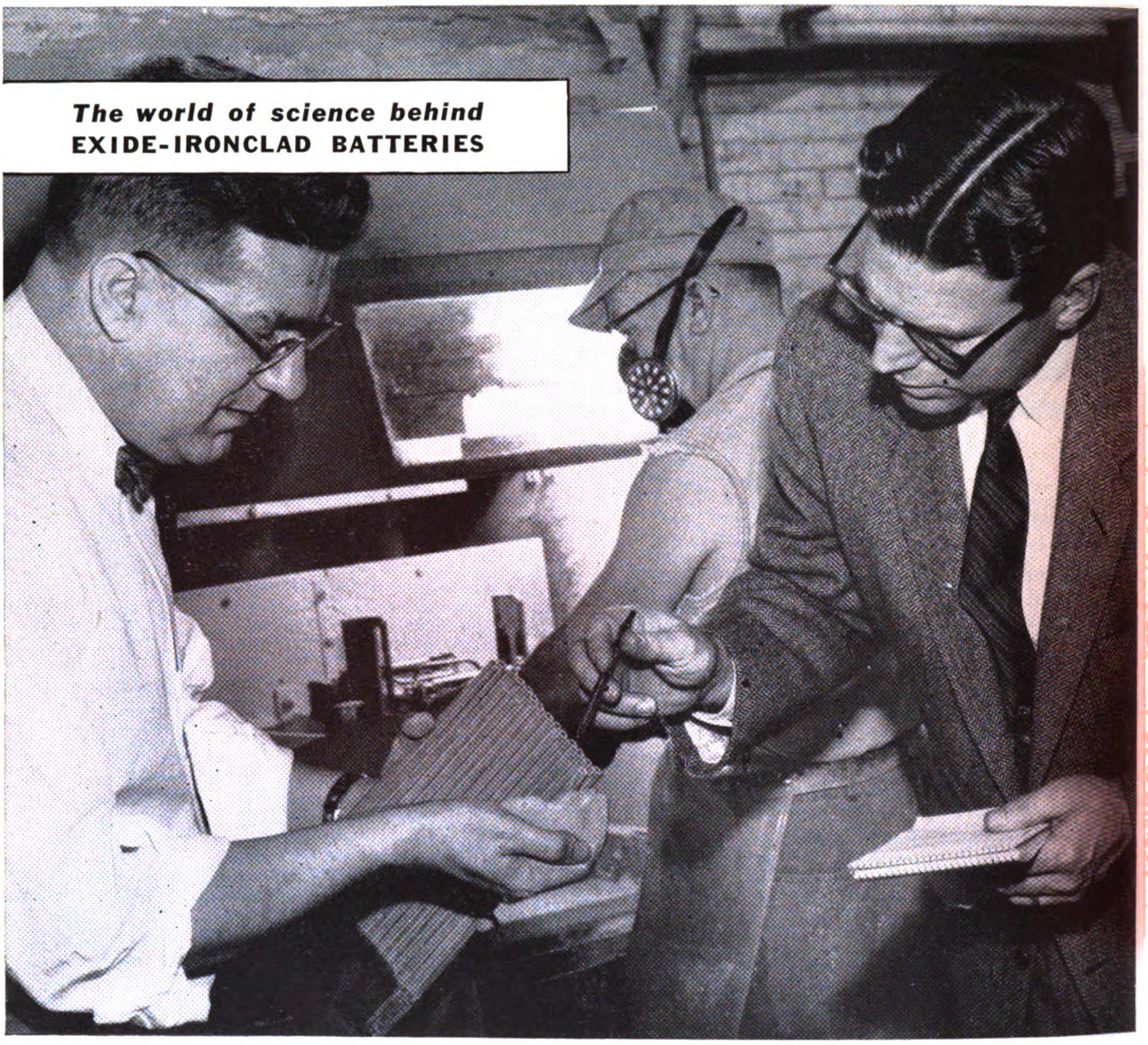
MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

The world of science behind
EXIDE-IRONCLAD BATTERIES



Being interviewed is E. A. Wagner, Product Engineer

"This oxide blend packs more power per ounce"

At the Exide Laboratories—**Reporter:** More power, Mr. Wagner? Do you mean the blend of oxides in Exide-Ironclad is different from that used in other batteries?

Wagner: Absolutely. We can use the more active oxides that give the batteries higher capacity.

Reporter: Why do you say *can?* Can't other batteries use these oxides too?

Wagner: It isn't likely. First, this blend is the result of more than 40 years of Exide research—and it's an Exide exclusive. Second, we can use it successfully because of the unique tubular construction of the Exide-Ironclad positive plate.

Reporter: How does tubular construction help make it a better battery?

Wagner: Because the cylindrical power tubes hold the tiny oxide particles firmly in electrical contact clear through the charge and discharge cycle. So Exide-Ironclad Batteries can maintain their high capacity—even under severe vibration—for years of service.

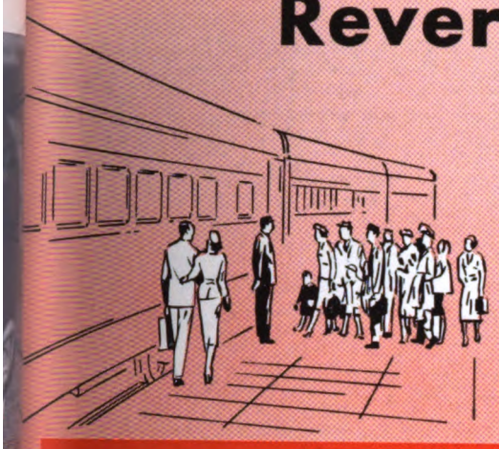
Reporter: Obviously, this is an important feature of Exide-Ironclad Batteries.

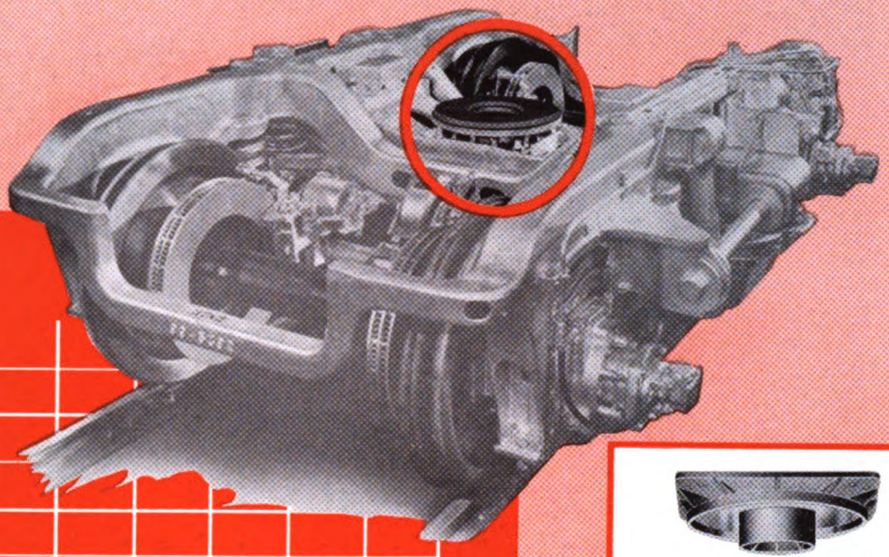
Wagner: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

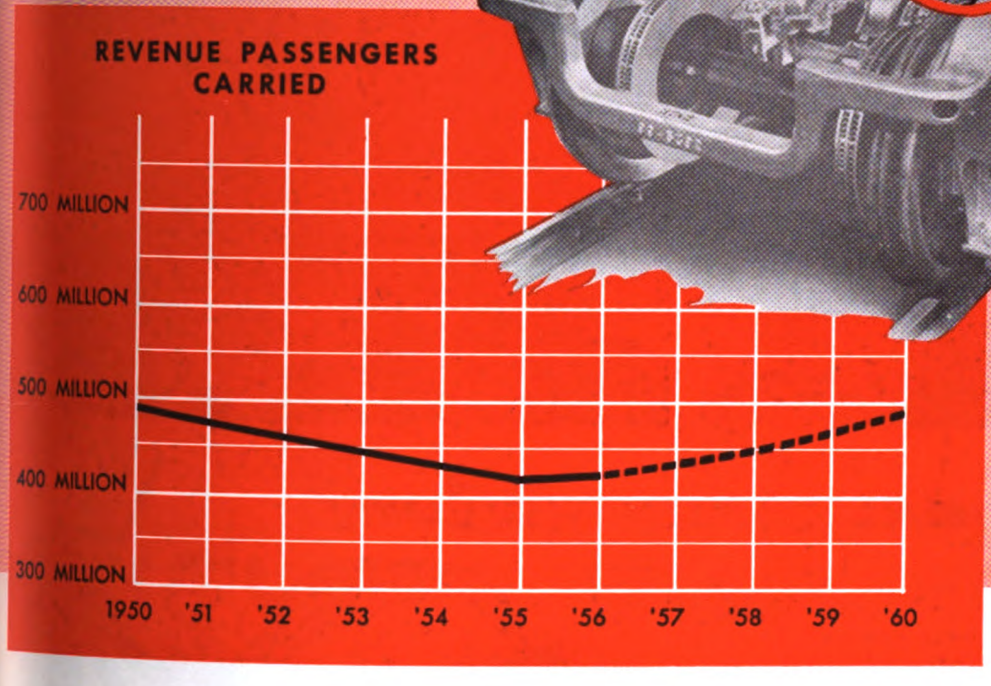
Note to battery users. Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Phila. 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

Reverse the Trend in Your Passenger Revenue

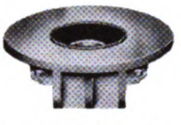






Body Central Bearing

Friction Pad



* Truck Central Bearing

Provide Greater Passenger Comfort with Commonwealth Central Bearings

Better riding of sleeping cars, diners and coaches means more comfort, attracts more passengers and increases your revenue.

Central Bearings which occupy the space formerly used by center plates provide a simple, positive way to assure smoother, more comfortable riding of existing cars, as well as new equipment. They eliminate lateral shimmy and side bearing problems. In addition they increase mileage between wheel turnings, decrease maintenance expense.

*Available in a simple easy-to-install package—Central Bearings are readily applied to existing cars.

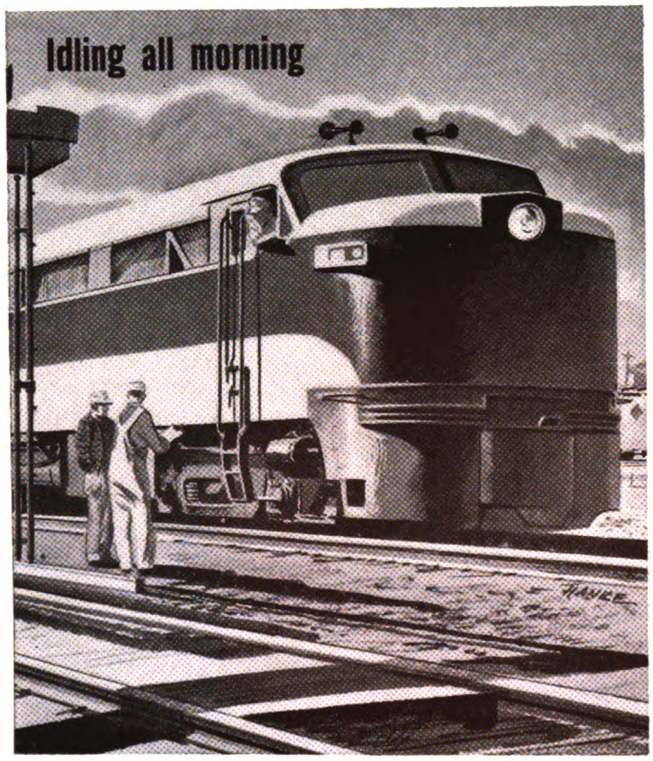
To attract more passengers—increase revenue and lower costs—use Commonwealth Central Bearings.

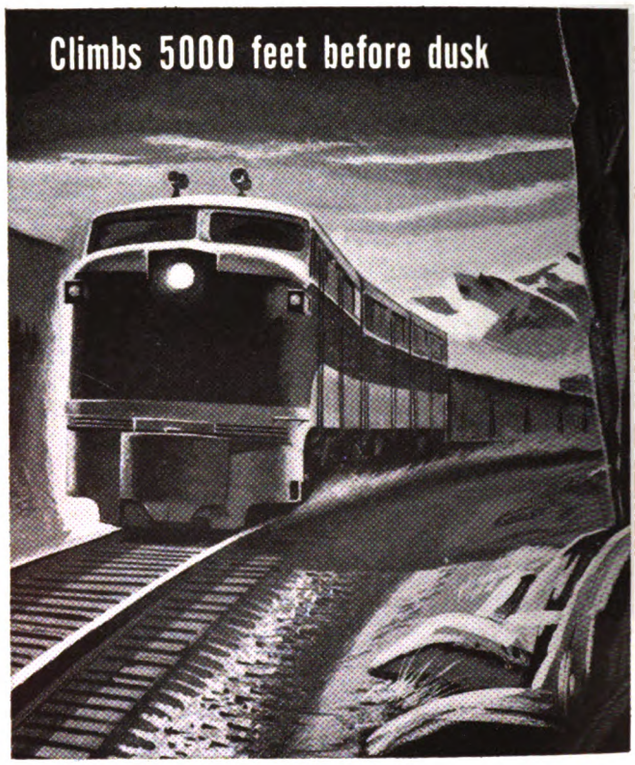
GENERAL STEEL CASTINGS

GEARED TO PROGRESS P R I MEMBER

GRANITE CITY, ILL. • EDDYSTONE, PA. • AVONMORE, PA.

This job isn't as tough as it looks...





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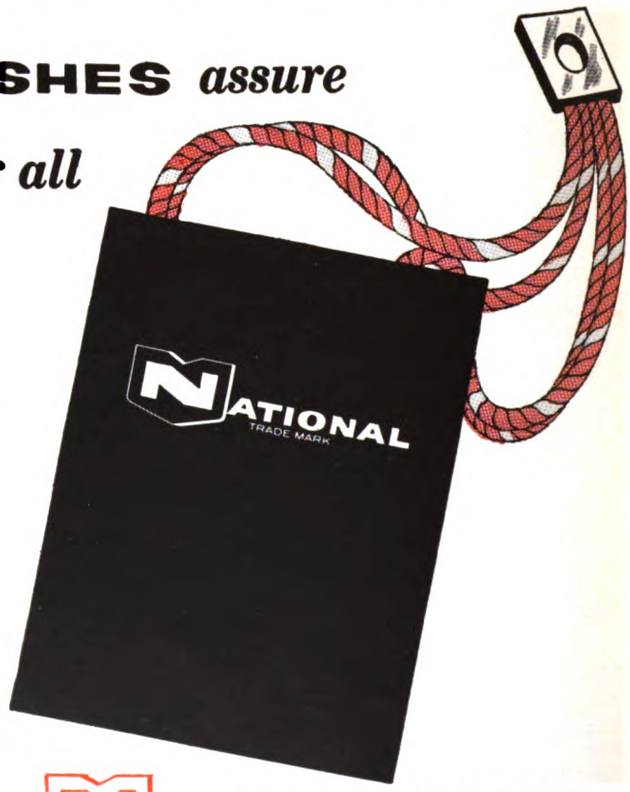

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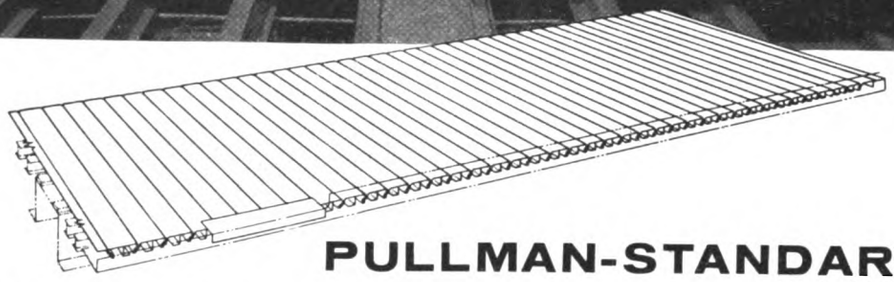

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NAILABLE STEEL FLOOR

provides 33% more nailing space... plus exceptional nail holding power

Cost and service conscious railroads all over the Great American Railway System are replacing wood decking with long-lasting, easily installed Pullman-Standard Nailable Steel Floor. Prominent carriers have over 2500 car sets of this outstanding lading and equipment protection product now in service or on order with Pullman-Standard.

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For complete details on this exceptional lading protection and car maintenance-reducing product by Pullman-Standard, write for literature or contact your nearest P-S sales office.

- **P-S design provides exceptional nail holding power with any size nail from 16d to 40d.**
- **Steel angle supports and plank joints provide floor support every three inches . . . help prevent crushing and dishing by heavy lift trucks and racks.**
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- **P-S flexible nailing joint snaps back . . . retains original holding power even after use of 30d or 40d nails.**
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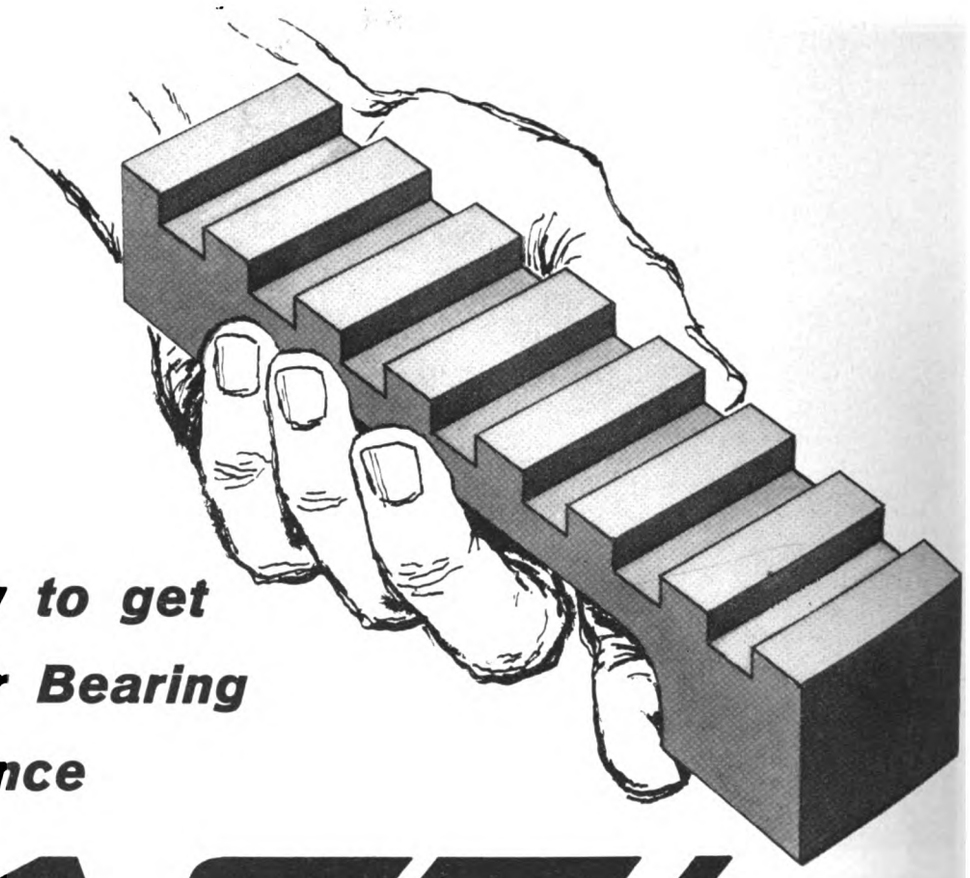

Surest way to get Better Bearing Performance

FAST!

Railroads have accumulated 30,000 car-months of service with R-S JOURNAL STOPS — and have averaged better than 6,000,000 car-miles per set-out

*M*AGNUS R-S Journal Stops, bolted to the inside of the box, on either side of the journal, positively prevent excessive axle displacement even under the severest road or switching impacts. All elements of the bearing assembly are kept *in place, all the time!* You maintain a constant hydrodynamic oil film that guarantees optimum journal bearing performance.

Magnus R-S Journal Stops are now installed on more than 2,600 cars which have accumulated more than 30,000 car months of service. In this time there have been only six road failures. That's equivalent to better than 6,000,000 car miles between set-outs. You can't beat that kind of performance with any other type of freight car bearing — or any other journal bearing device.

For full information on R-S Journal Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

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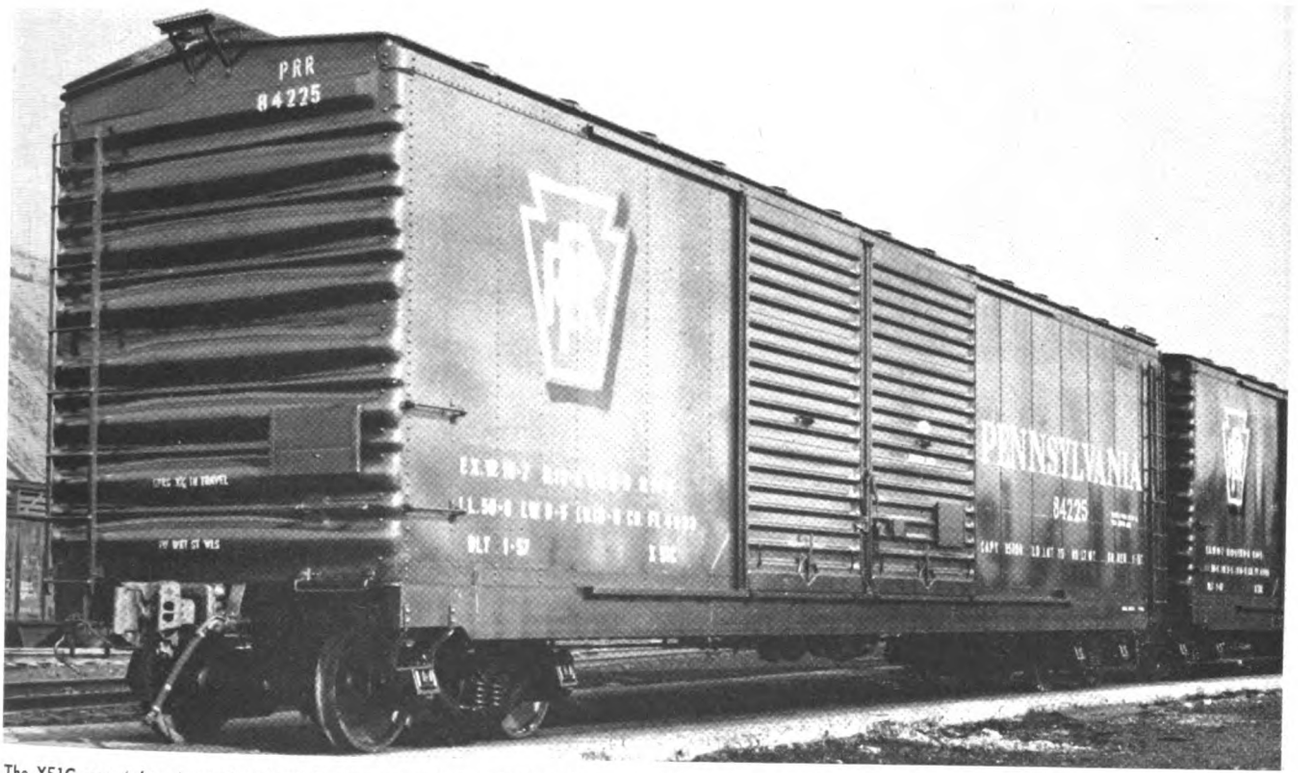


The X51C car (above) equipped with Chrysler "Universal" Loaders has an average light weight of 68,100 lb. Class X51B's weigh 68,100 lb, the X51A's weigh 58,700 lb and X51 light weight is 72,600 lb.

Pennsy Box Cars Should Stay Square

Diagonal crossbearers brace the underframes of 1,600 big box cars—the first built at Samuel Rea shop.

The Pennsylvania's X51 box car building program just completed at the Samuel Rea shop at Hollidaysburg, Pa., represented two innovations. These are the first new cars to be built at Samuel Rea—the world's largest railroad-owned car shop (*Railway Locomotives and Cars, November, 1955, p. 39*). The cars themselves incorporate an innovation in freight car design—diagonal crossbearers in the underframe construction. Concerning this arrangement, H. L. Decker, PRR mechanical engineer, recently stated, "To our knowledge, this underframe design incorporating diagonal crossbearers is original with the Pennsylvania Railroad."

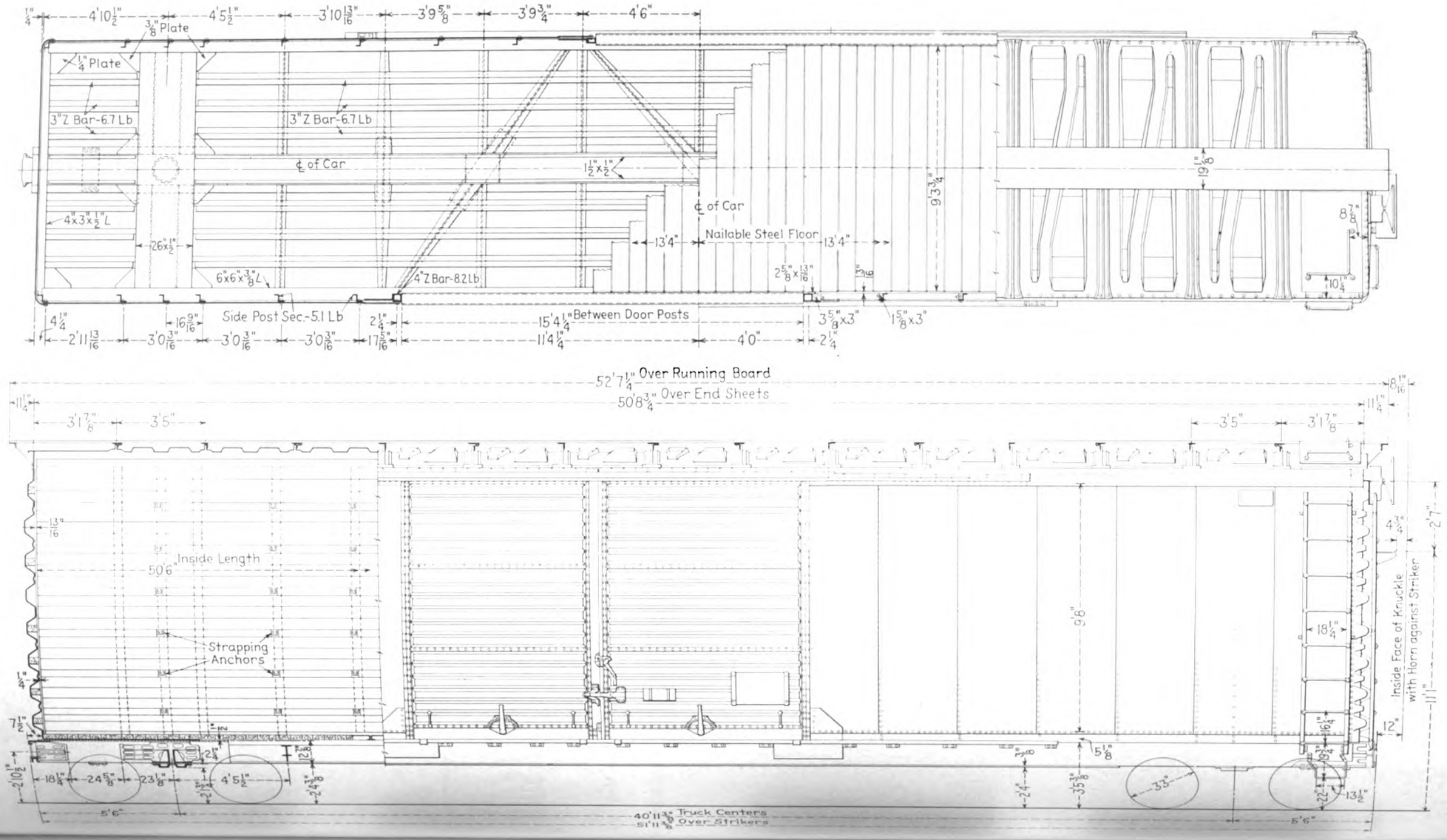
The X51 program called for the building of 1,600 of these 50-ft double-door cars. The diagonal crossbearers are intended to transfer the load to the side sills at locations where the full strength of the car can be utilized. This eliminates the transfer of concentrated loads from the center of the car to the side sills in the door openings as is done with the normal type of crossbearer construction. Also, the diagonal crossbearers serve to better absorb, and distribute into the car body, buffing shocks which result from excessive coupling speeds and slack action in trains.

Theoretically, this type of underframe construction should provide a solid foundation which will keep the car body square and the floor of the car in a horizontal plane. At the present, the Pennsy is unable to

(*Text continued on page 39*)

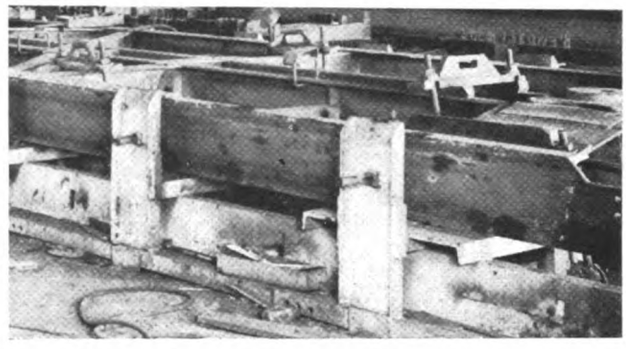
NEXT PAGE: CAR PLAN ►

THIS IS THE PENNSY'S X51A DESIGN



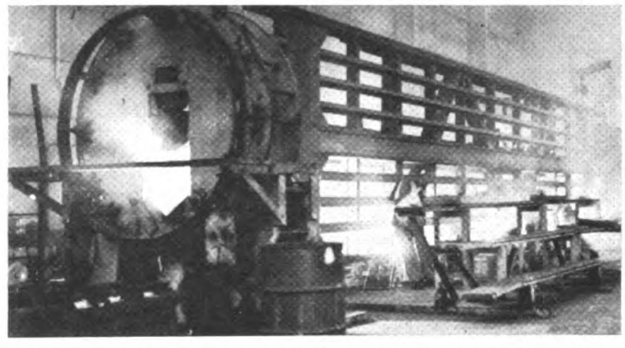
PENNSY PRODUCES ALL-WELDED X51 UNDERFRAME . . .

Center sill Z sections are welded with Lincoln submerged arc process at Altoona and are then moved to the Rea shop for assembly.



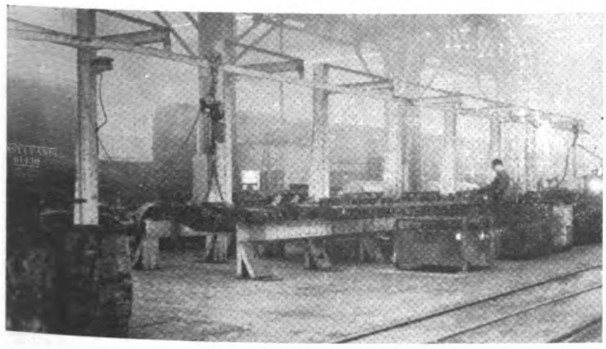
Underframe assembly jig holds subassemblies and other components necessary to produce the diagonally-braced underframe.

Tack welding throughout and some final welding are performed while the underframe components are in the assembly jig.

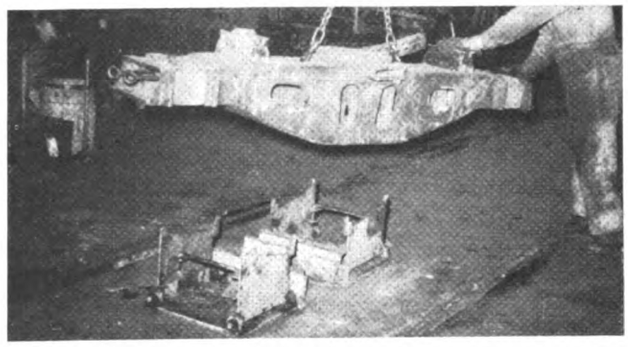


Tumble jig positions tacked underframe assembly so that the finish welding can all be completed in downhand position.

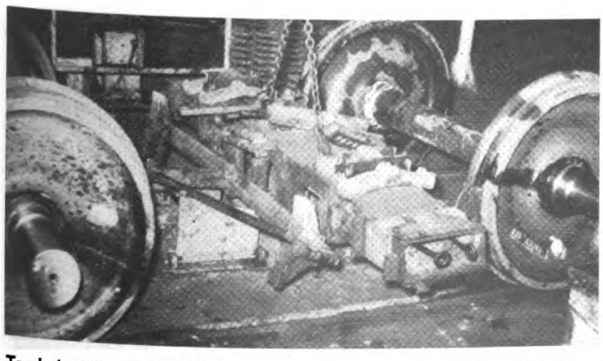
PRR HAS PRODUCTION LINE TRUCK ASSEMBLY . . .



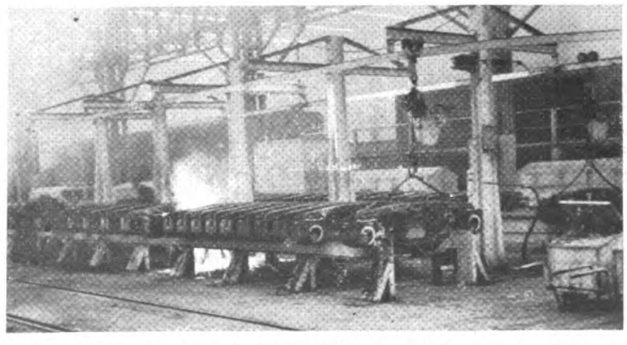
Bolster assembly line installs ride control, side bearings and dead levers fulcrums. Tramrail-mounted hoist moves bolster to assembly jig.



Truck assembly jig locates bolster, brake beams and wheels so side frames slip on. Jig folds down to roll completed truck out.

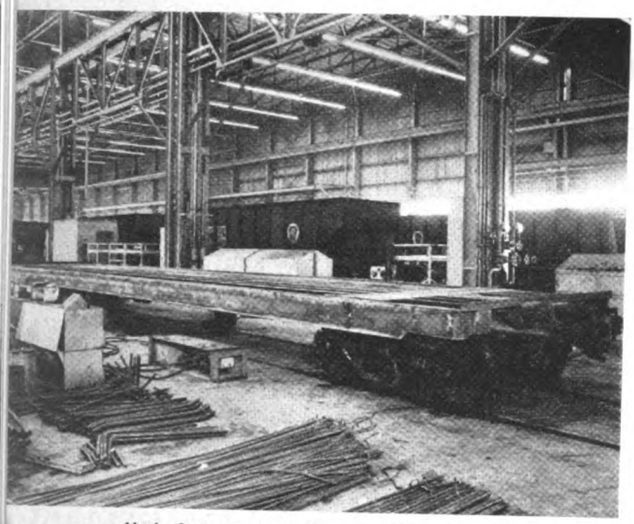


Truck building is the first operation on the box car assembly line. Pins in bolster ends secure ride control till side frames are installed.

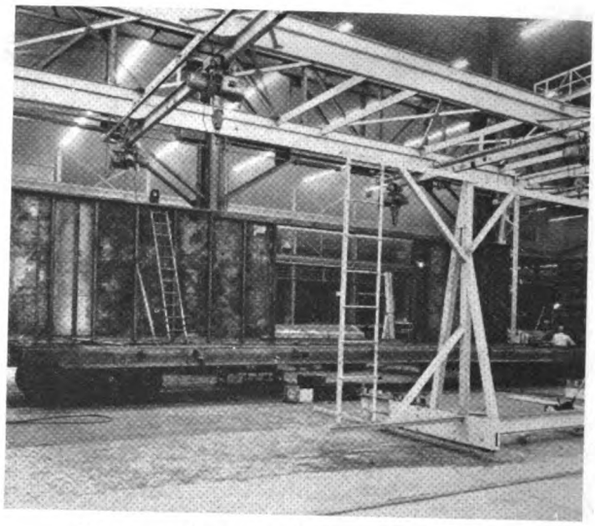


Side frame assembly installs lids, lubricators and dust guards. Separate hoists move up the truck's two side frames to parts on assembly jig.

THIS IS X51 PRODUCTION LINE AT SAMUEL REA



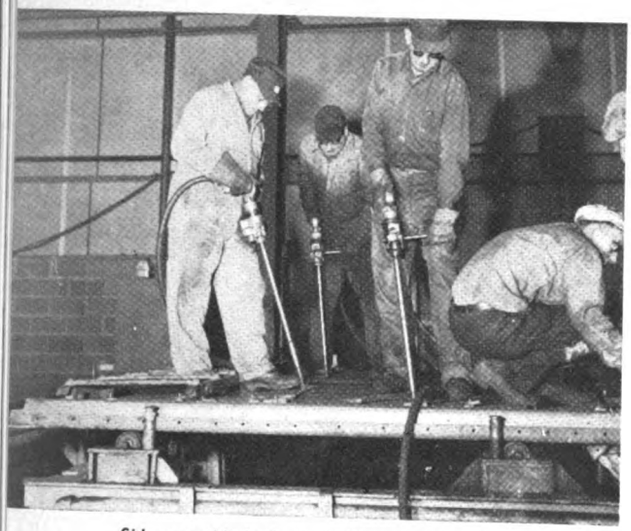
Underframe is placed on trucks with overhead cranes. Major portion of the air brake equipment is applied at this position.



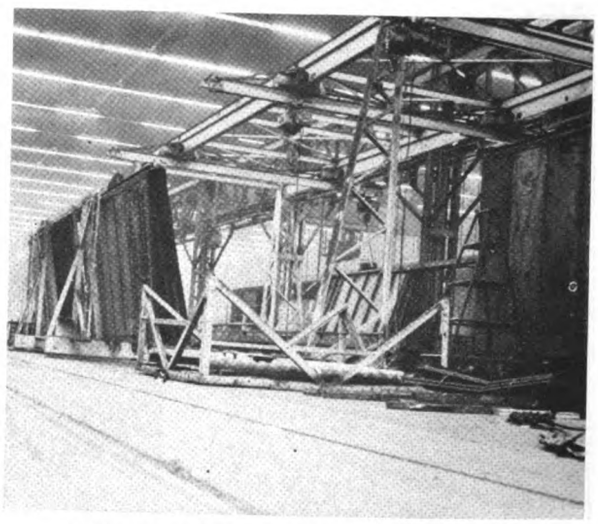
STEP 1
Put underframe on trucks. Air brake parts and piping applied.

STEP 2
Apply, fit up, and ream sides on underframe. Weld gussets at doorways.

Side assemblies are each hung with two electric hoists which move them in from storage racks on each side of the assembly track.



Side assembly is three-position operation. Sides are rolled from fitting-up position to be reamed and finally to be driven.

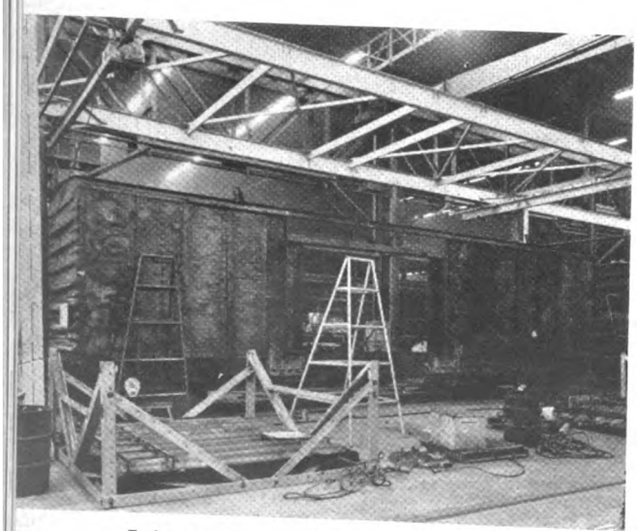


STEP 3
Apply, fit up, and ream ends.

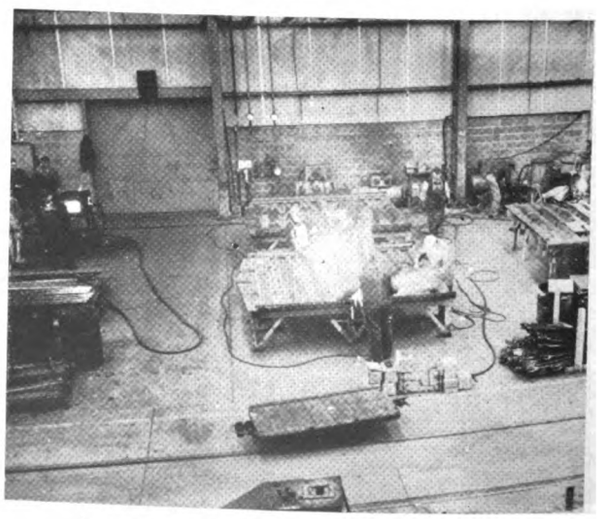
STEP 4
Apply, fit up, and ream roof components.

Sides and ends are stocked in racks ready to be applied to cars as they proceed down the assembly line. Sides are applied first.

STEP 5
Rivet sides at sills and ends. Drive eaves and roof components.



End assemblies are applied to both ends of car while car is at one station. This requires a separate hoist for each end.



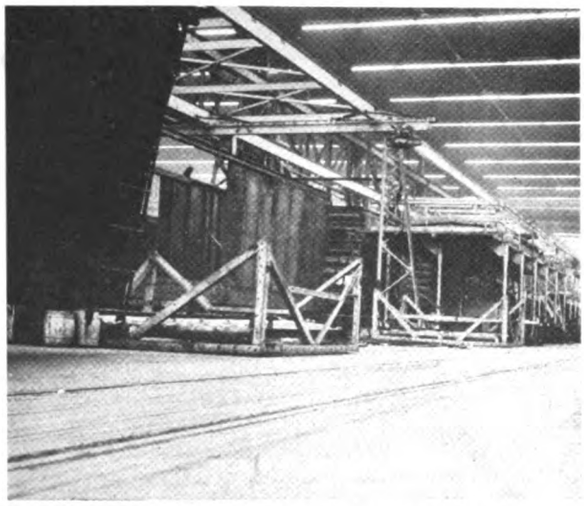
STEP 6
Apply threshhold plates and run boards. Complete welding ends and sides to underframe.

STEP 7
Door tracks and doors applied. Finish and test the hand air brakes.

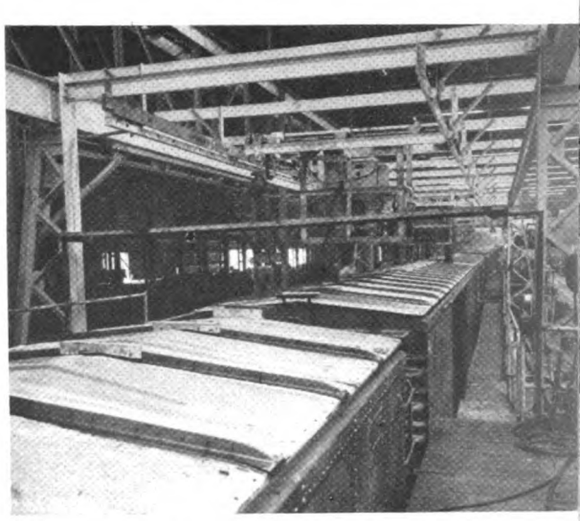
End assembly is three-step operation consisting of tack welding halves, final welding, and application of fittings including riveting.

STEP 8
Clean exterior; apply cement to underframe and lower inside of sides.

STEP 9
Install nailable steel floor and weld on top at side sills.



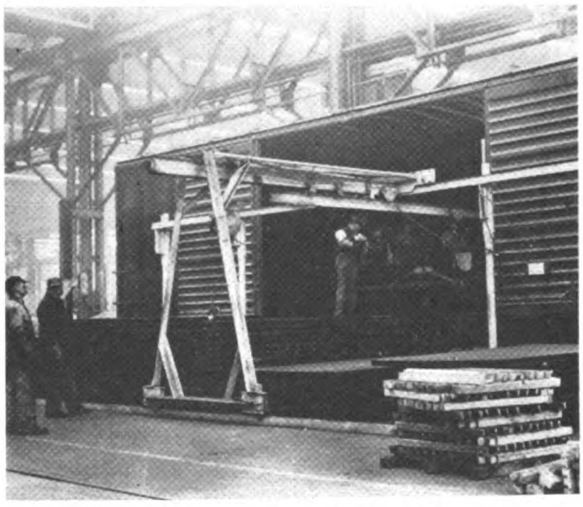
Roof panels and run boards are stocked and applied at elevated platforms just beyond side and end application. Roof riveting is done here.



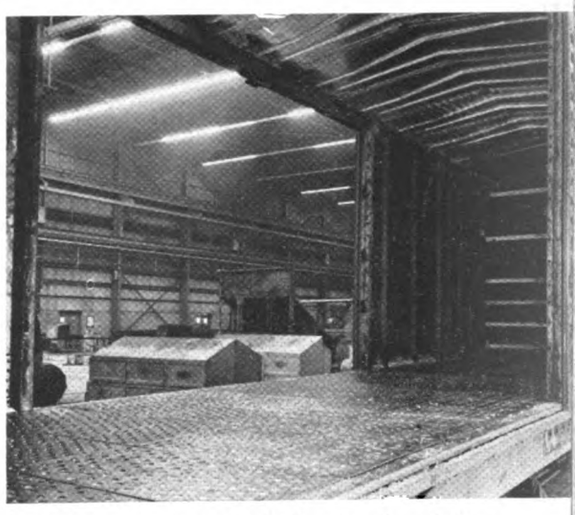
Cold riveters used on roof and running board assembly are mounted on moveable overhead carriages; they can be moved the length of the car.

STEP 10
Install wooden floor and the border.

STEP 11
Drill, attach wood floor and plates. Complete welding nailable steel flooring.



Gantry-type hoist makes it possible to place the nailable steel flooring panels through a 26-ft 8-in. doorway area on most X51's.



Perforated floor plates completely covered wood floor on 500 X51 cars. Others got nailable steel floor at doorway, unprotected wood in the ends.

NEXT STEP IS APPLICATION OF LOADER EQUIPMENT ►

(Continued from page 35)

fully evaluate this design because no laboratory tests have been conducted, nor have the cars been in service long enough to judge their performance. Plans have been made to conduct both static and impact tests with full instrumentation to obtain data for use in determining future freight car designs.

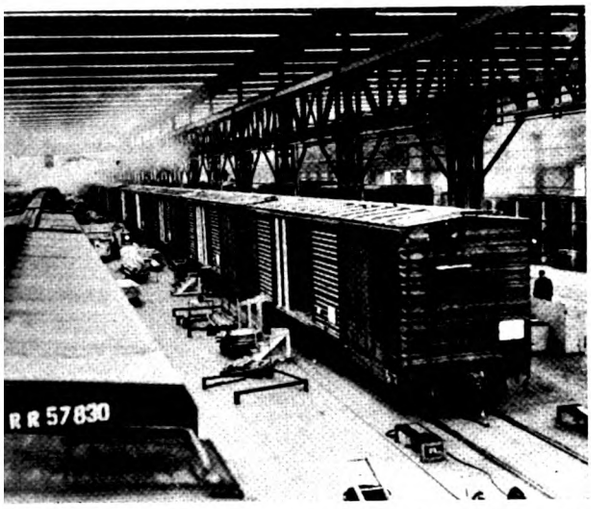
The center sill for the X51 cars is composed of two AAR 36.2-lb Z sections, and side sill reinforcing channels are 13-in., 31.8-lb car building sections. The side sill reinforcement provided by these large channels was necessary to maintain a low stress level at the 15-ft free span of the doorway opening. Conforming with the latest AAR requirements, the cars have three 3-in., 6.7-lb Z-section floor stringers on each side of the center sill. These stringers are continuous from bolster to bolster and are attached not only to the conventional crossbearers and crossties, but to the diagonal crossbearers as well.

Car Classes Differ

There are four groups of cars of the X51 type in this building program. Most of them are being assigned to automobile parts service and are fitted for this purpose. The 1,600 cars are equipped as follows:

- Class X51, 500 cars, are wood lined only at the ends and have 2⅜-in. wood floors throughout covered with $\frac{3}{16}$-in. perforated steel plates. The cars are equipped with 19 belt rail Evans "DF" loaders for automobile parts service. Type F couplers are used on 281 cars and Type E couplers are used on the remainder.

- Class X51A, 398 cars, are wood lined throughout and have 72 flush-type lading strap an-



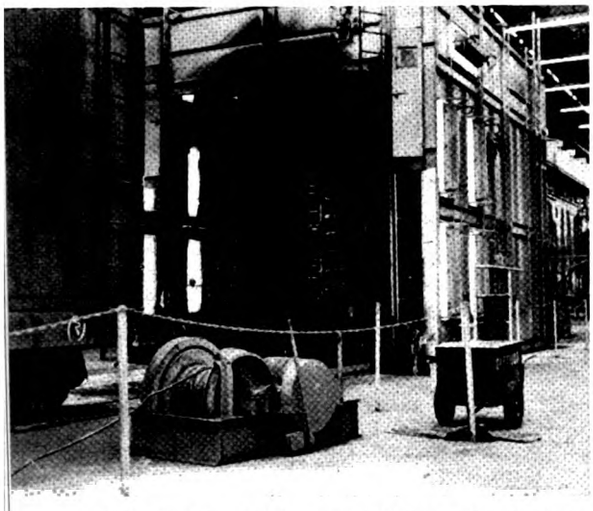
Auto parts loaders are applied through series of assembly stations on X51 assembly line after the car itself has been completed.

Jigs are used to assemble the side and end lining boards into sections before application to the car. All cars were lined at ends.

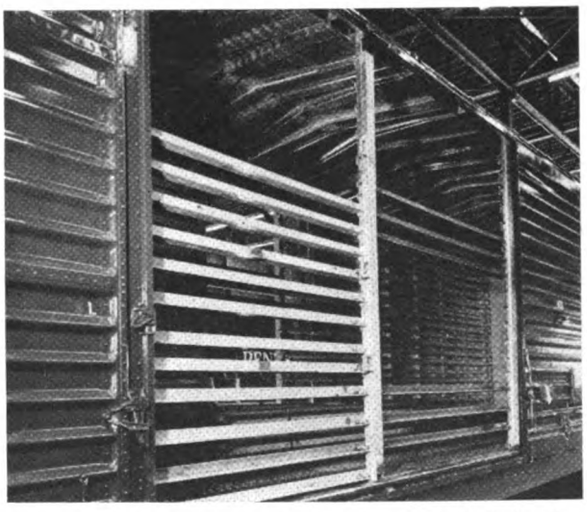
STEP 12
Install special loader devices or side lining.

STEP 13
Apply the end lining.

STEP 14
Apply coating on steel flooring.



Binks traveling paint spray booth has reduced exterior finishing of the X51 cars to matter of minutes. Winches move cars on production line.



After the "DF" loader equipment is installed, interiors of X51 cars are spray painted, including steel floor but not galvanized roof.

STEP 15
Spray painting of interior.

STEP 16
Exterior painted in the traveling spray booth.

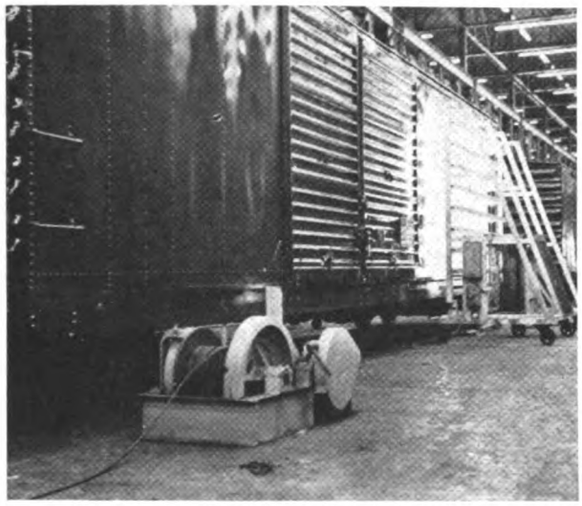
chors on the intermediate side posts and 36 additional anchors incorporated in the door posts for general service. Nailable steel floors in the doorways for a distance of 26-ft 8-in. and unprotected 2⅜-in. wood flooring covers the remainder of the car. All cars have Type F couplers.

• Class X51B, 202 cars, are wood lined at ends only and have the same floor used in the X51A cars. This series is equipped with 18 belt rail Evans "DF" loaders for automobile parts service, and all cars have Type F couplers.

• Class X51C, 500 cars, are end lined only and have the same floor used in the X51A cars. The cars are fitted with Chrysler-design "universal" loaders for automobile parts service and 219 of them have Type F couplers.

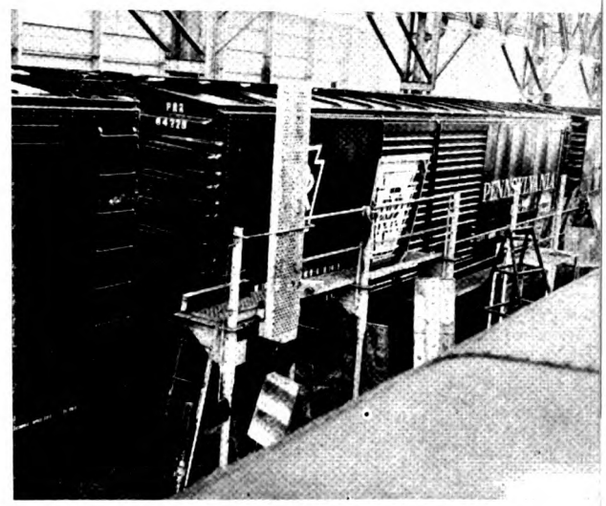
The cars were assembled at Samuel Rea shop at the rate of twelve per 8-hr day during much of the production run. Center sills complete with fillers, draft stops and strikers were assembled at the steel shop at Altoona works. Bolsters and diagonal crossbearers were assembled at the Juniata welding shop. These subassemblies went into the underframe assembly jig at the Rea shop along with the side sill channels, end sills, regular crossbearers, cover plates, couplers and draft gears. Angles, channels and plates are all cut, shaped and punched at Altoona works. The Rea shop only performs assembly oper-

STEP 17
Infrared drying of areas to be stencilled.



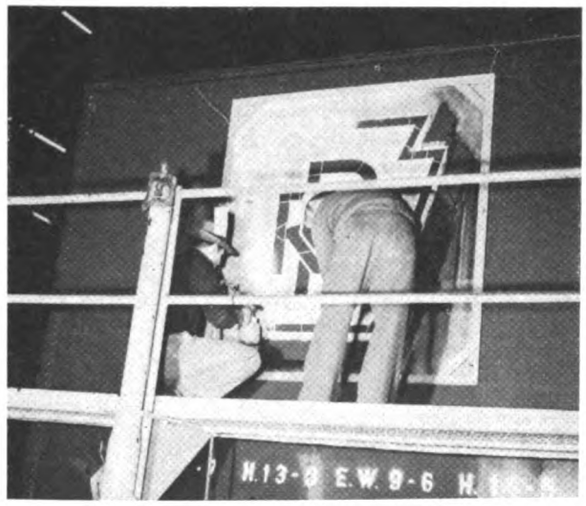
Infrared lamp banks are rolled up to each side of the car to dry areas to be stencilled. Lamps are about 2-ft from car side.

STEP 18
Spray exterior and interior stencilling.



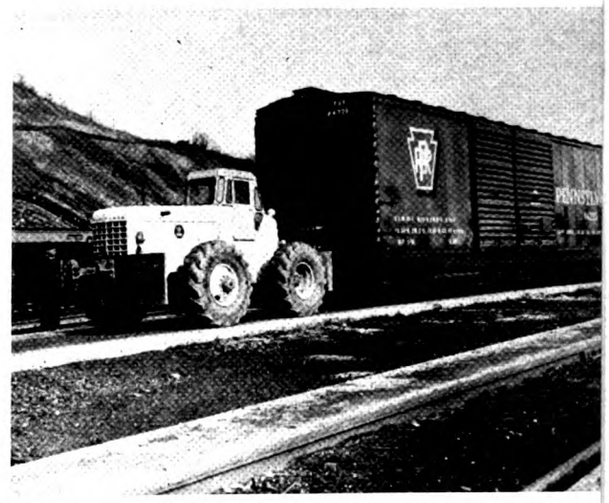
Stencilling station has platforms and spray equipment for rapid application of the large emblem and lettering now standard on Pennsy.

STEP 19
Final inspection and necessary corrections.



Spray stencilling is applied through patented stencils held against the car side with series of small permanent magnets.

STEP 20
Weight car and complete the stencilling.



Ready for weighing and shipment, Pay Loader tractor with couplers moves the completed X51's from the east end of the Samuel Rea shop.

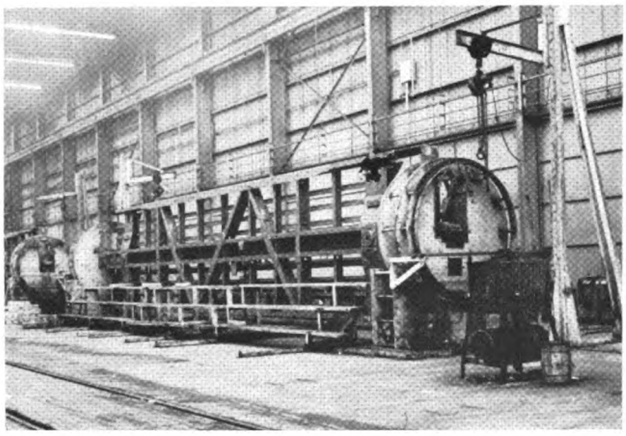
STRUCTURAL DETAILS AND SUPPLIERS FOR X51 BOX CARS ►

ations, and the X51 underframes are welded throughout. All steel ½-in. thick or less in these cars is copper-bearing steel.

Much of the production line stocking was performed after the daily 8-hr assembly operation had stopped. This work was done by the overhead cranes which cover the 2,760-ft production line, and by lift trucks and tractor trains. Most of the subassembly operations can be serviced by traveling, wall-mounted cranes which do not tie up the overhead traveling cranes. This frees overhead traveling cranes for moving completed underframes, sides, ends and other heavy parts to the assembly operation as those parts are produced or needed. Cranes and hoists are also provided at many of the assembly stations. The adjacent tracks in the main bay of the Rea shop are utilized as production lines for the repair of box, gondola and hopper cars, and are operated in a manner similar to that for the new cars.

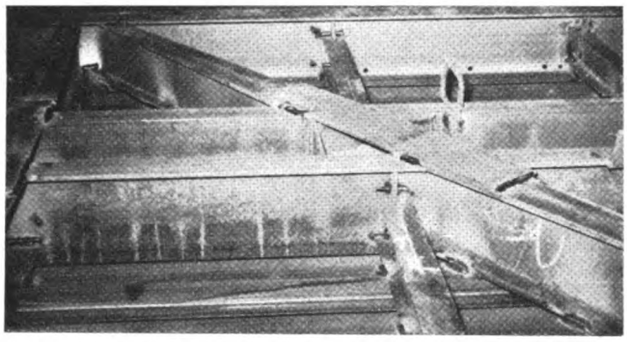
All of the 1,600 X51 type cars are equipped with ride control trucks having $3^{11}/_{16}$-in. travel springs, Unit brake beams, and AAR approved journal box lubricators. These cars have an inside length of 50 ft 6 in., an inside height of 10 ft 6 in. The inside width varies from 9 ft 2 in. for the Evans "DF" loader equipped cars to 9 ft 4 in. for the Class X51A general service box cars. The Class X51A cars have a cubical capacity of 4,994 cu ft.

DIAGONAL CROSSBEARERS GET LOADS AWAY FROM X51 DOORWAYS

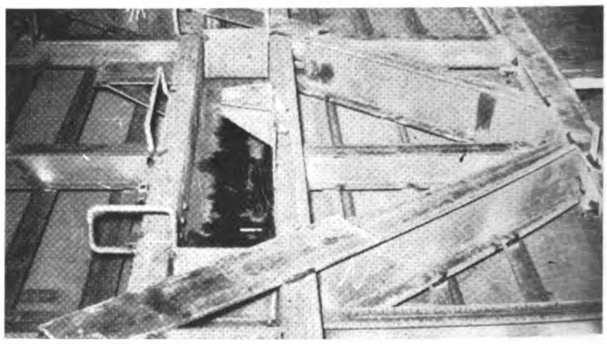


Diagonal crossbearers in underframe show plainly while assembly is held vertically in welding jig at the Samuel Rea shop.

Floor stringers are continuous from bolster to bolster. They are supported, welded at all cross members including diagonal crossbearers.



Non-continuous, diagonal crossbearers are aligned across center sill and have channel spreaders inside sill.



Cover plate across the bottom of the center sill connects flanges of the two separate diagonal crossbearer assemblies.

Specialty Suppliers for X51 Cars

Ajax Consolidated Co.:
Handbrakes

Alco Products, Inc.:
Journal Box Lids

American Brake Shoe Co.:
Brake Shoes

American Steel Foundries:
Bolsters, Couplers, Side Frames, Yokes, Strikers, Brake Beams

Apex Railway Products Co.:
Running Boards, Brake Steps

Birdsboro Steel Foundry and Machine Co.
Bolsters, Side Frames

Broen Metal Products, Inc.
Loader Equipment

Buckeye Steel Castings Co.:
Bolsters, Couplers, Side Frames, Yokes, Strikers, Center Fillers

Buffalo Brake Beam Co.:
Brake Beams

Cardwell Westinghouse Co.:
Draft Gears

Central Railway Supply Co.:
Pipe Clamps

Chicago Malleable Castings Co.:
Brake Beams

Chicago Railway Products Co.:
Brake Beams

Continental Foundry & Machine Co.:
Strikers, Center Fillers

Davis Brake Beam Co.:
Brake Beams, Journal Box Lids

Evans Products Co.:
Loader Equipment

Klasing Handbrake Co.:
Hand Brakes

MacLean Fogg Lock Nut Co.:
Lading Strap Anchors, Threshold Plates

McConway & Torley Co.:
Couplers, Yokes, Strikers

Miller Lubricator Co.:
Journal Lubricators

W. H. Miner, Inc.:
Draft Gears, Handbrakes

Morton Manufacturing Co.:
Running Boards, Brake Steps

Motor Wheel Corp.:
Journal Box Lids

National Brake Co.:
Handbrakes

National Malleable & Steel Castings Co.:
Bolsters, Couplers, Side Frames, Yokes, Strikers

Peerless Equipment Co.:
Draft Gears

Pittsburgh Steel Foundries:
Side Frames, Bolsters

Schaefer Equipment Co.:
Trucks Levers and Spreaders

Security Railway Company:
"Journa-Pak" Journal Lubricators

Standard Railway Equipment Co.:
Uncoupling Devices, Roofs, Ends, Perforated Floor Plates

Stran Steel Division, National Steel Corp.:
Nailable Steel Floors

A. Stucki:
Side Bearings

Symington Gould Corp.:
Bolsters, Couplers, Yokes

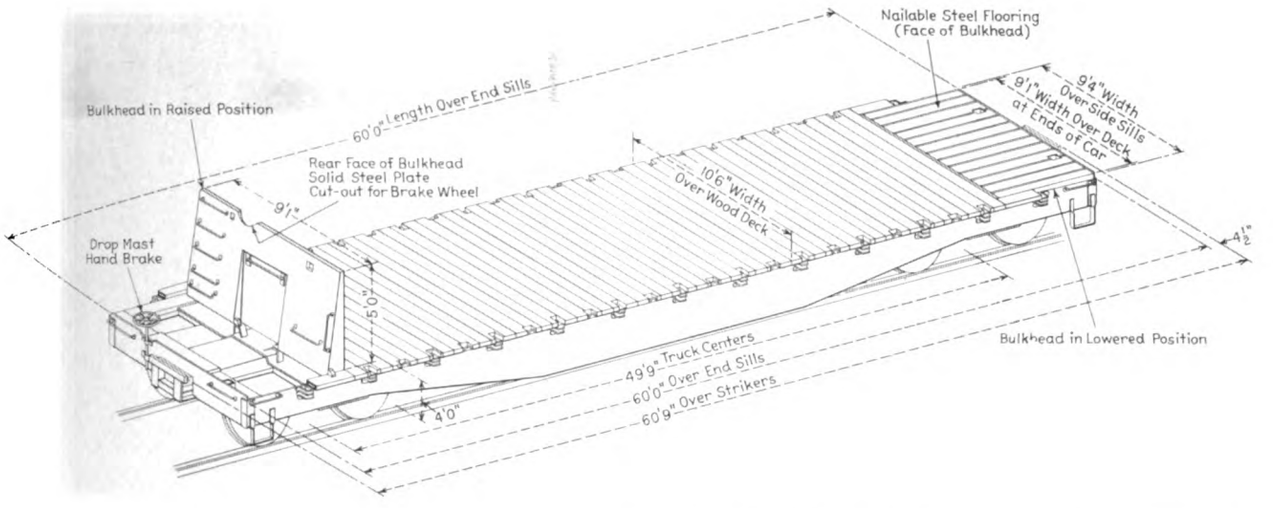
Universal Railway Devices Co.:
Handbrakes

U. S. Gypsum Co.:
Running Boards, Brake Steps

Waugh Equipment Co.:
Draft Gear, "Ply-Pak" Journal Lubricators

Whitehead and Kales Co.:
Loader Equipment

Youngstown Steel Door Co.:
Doors



Counterbalanced bulkheads can be handled by one man. Locking arrangement secures them in the raised position. Car has been designed so floor is at regular height.

Rock Island Builds . . .

Flat Car with Disappearing Bulkheads

Car fitted with folding ends is able to handle variety of loads

The last order of 70-ton, 60-ft flat cars, built new by the Rock Island at the Blue Island shops, included one car with hinged bulkheads, one at each end of the car. With the bulkheads down, the entire floor of the car is flush for conventional loads. With the bulkheads up, lumber and other materials can be carried with full protection at the ends. Two AAR classifications fit the car now. As a flat car, it would be designated "FM," and, with the bulkheads up, it would be "LP." Recent shipment of bulldozers to the west coast with it as an "FM" car and a return load of lumber with it as an "LP" car point up double-duty usage.

Hinged Bulkheads

The bulkheads, 9 ft 1 in. wide, are hinged 5 ft 8 in. from each end of the car and are 5 ft in height in raised position. There are 9 in-line hinges at the bottom of each bulkhead and a 9-ft 9-in. long, 1½-in. diameter hinge pin for each bulkhead, connecting to floor hinges.

Counterbalanced Ends

Six counterbalance springs are fastened at the bottom of each bulkhead, three on each side of center line of car. The tension is so adjusted that one man can easily raise or lower the bulkhead in position. When the bulkhead is in raised position, it is locked in place by four traverse locking bars, two on each side, actuated by a pinion gear meshing with gear teeth on the locking bars. A crank, provided for movement of the pinion gear, causes the locking bars to move in opposite directions, engaging the sides of the car and a plate attachment to the center sill for locking.

When the bulkhead is in lowered position, a cam and latch arrangement at the end of the car provides positive locking in place to the end sill. There are two bulkhead locks on each end of the car.

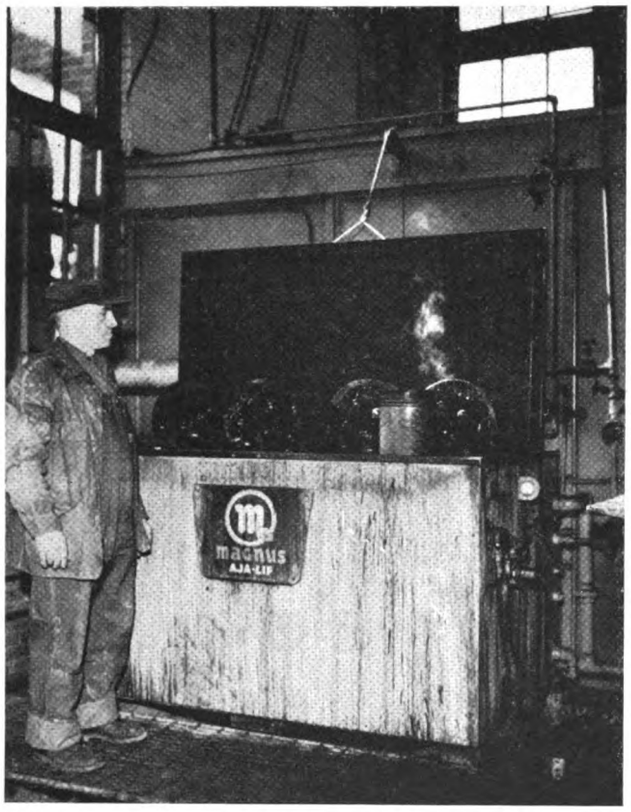
The top surface of each bulkhead in lowered position is covered with nailable steel flooring. The rear face of the bulkhead is $\frac{3}{16}$-in. steel plate, equipped with grab irons and stake pockets. The bulkhead at one end of car is cut out at top for hand brake wheel clearance.

Special shallow-type body bolsters were used to provide clearance for the bulkhead wells.

Wood Decking

Treated gum decking is used for flooring between these bulkhead wells. There are 12 "MF" lading anchors per side between the stake pockets, which number 17 per side.

The trucks have 6 by 11 journals, one-wear 33-in. cast-steel wheels, unit brake beams and roller side bearings. Rubber draft gears are used, and the brake equipment includes an automatic slack adjuster.



Pistons start into cleaning tank. Aja-Lif provides up-and-down movement insuring removal of oily coating.

Piston, dried after hot water rinse, ready for cleaning by combined action of steam jets and grit abrasive.

Here's How the Milwaukee . . .

One man and production line methods, using the Vapor Blast Liquid Honing machine, gets 32 pistons cleaned per day. This contrast with 8 to 10 per day by hand cleaning depending on the condition of the pistons, and not getting a thoroughly clean job. To get the same production as the machine would require 3 to 5 men.

The pistons are brought in on skids, and the rings are stripped off. A basket containing 20 pistons is set in a Magnus Aja-Lif cleaning tank, where an up-and-down motion washes them for 15 minutes at 190 deg. F. in cleaning solution.

After washing, the pistons are rinsed in hot water at 190 deg. F., placed on skids and dried.

Removing the carbon from the bottom of the ring grooves previously had been a long process with hand tools.

This problem was solved by a shop-made device, consisting of two half-moon 2-in. pieces of steel plate, hinged at one end and handles on the other. Carbide inserts were placed 120 deg. apart and a width suitable for the grooves. A couple of rotations of this device and the job is done.

Liquid Honing

Each piston is then placed in the liquid honing machine for 10 min. Three fixed abrasive guns, using No. 100 grit, move up and down automatically over the piston as it rotates. One gun cleans the outside, one the inside, and the third is used for "high-spotting" and cleaning the piston crown. A hand operated gun can be directed by the operator through an observation window to remove stubborn deposits. The machine is self-contained, requiring only air, water, power and exhaust connections.

After the cleaning operation, the piston is rinsed in hot water containing anti-rust inhibitor, inspected for cracks by magna-glo and checked for size and general condition. New rings are applied, and the piston is either stored or used in the shopping program.

The valves follow generally the same routine of cleaning as the pistons. They are brought in the shop in baskets, and cleaned with heavy cleaner. After drying they are placed in a fixture for 10-min. in the liquid honing machine.

Because the valve head diameters vary, three special shop-made fixtures were made to hold the valves and position them for cleaning. Thirteen EMD valves, 7 Alco and 6 Baldwin can be cleaned, each set

Operator uses hand jet to remove stubborn film.

Cleaned piston gets bath in hot water containing anti-rust inhibitor.

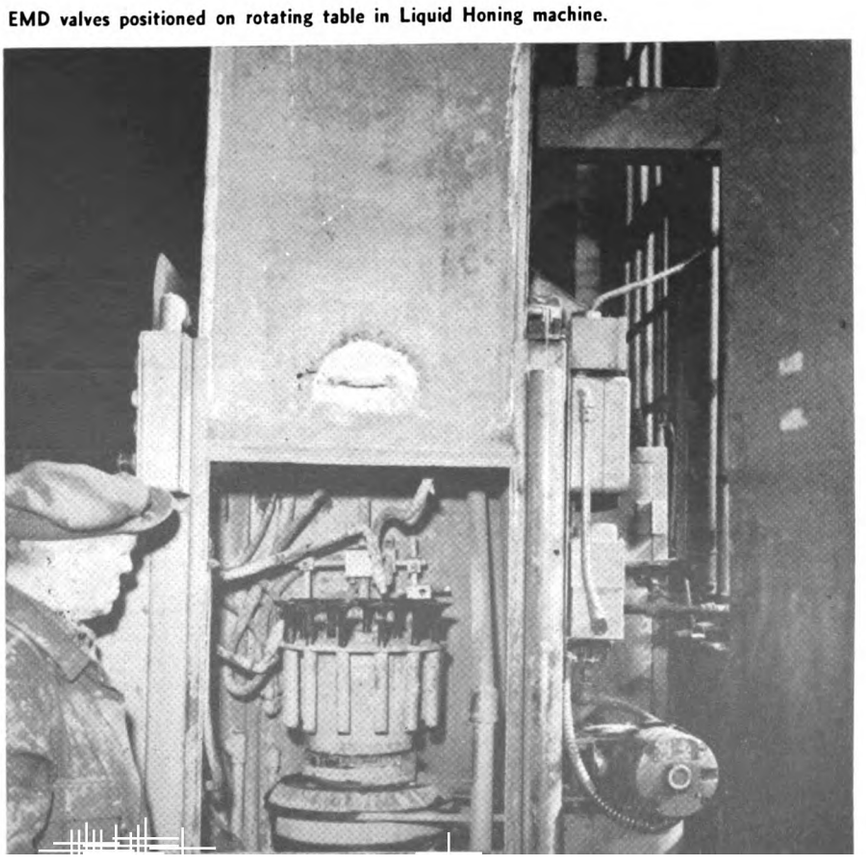
Cleans Diesel Engine Pistons and Valves

at a time. With this operation, for example, it is possible to get 480 EMD valves in an 8-hour operation. Previous production by sand-blasting was 70 to 80 in the same period.

Checking for Cracks

After cleaning, the valves are dried and the seats ground. The last step is to check for flaws and Turco's No. 30 Dy-Chek Kit is used. The heads of the valves are dipped in a non-water soluble red dye penetrant, washed with a remover emulsifier and allowed to dry. The emulsifier makes the surface of the valve water soluble and removes the excess penetrant from the surface. A white developer is sprayed on the valve seat, and if there are any cracks, the red color which has penetrated the cracks shows up through the white coating.

EMD valves positioned on rotating table in Liquid Honing machine.



Eleven Years' Service Tests Produce . . .

Standardized PS-5 Gondola

Pullman-Standard Car Manufacturing Company has announced its fifth standardized freight car, the PS-5 gondola. It is now available in the basic 70-ton, 52-ft 6-in. size, or the 70-ton, mill type of 65-ft 6-in. length.

"Development of this gondola resulted from exhaustive design and engineering tests conducted in conjunction with the St. Louis-San Francisco railroad, the Rock Island and Pullman Standard," C. W. Bryan, Jr., president of the company said.

The Frisco received 400 of the basic type design in 1949 and the Rock Island 300 of the mill type in 1953. Results of service tests plus P-S standardization concepts, led to its addition to their car fleet.

The basic gondola underframe consists of two 41.2-lb, "Z" sections welded the full length of car to form the center sill. The bolster center filler is P-S built-up and arcwelded design. There are six built-up, arcwelded cross bearers, with four pressed plate crossties and two I-beams included in the construction.

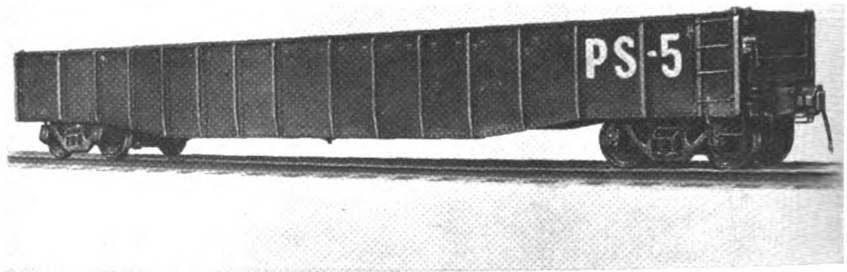
Copper Bearing Steel

The floor is 3/8-in. copper bearing steel plate, butt-welded together on top of the underframe cross members and designed to withstand severe impacts and loads without excessive dishing. Floors can also be furnished of wood, a combination of wood and steel, and the P-S nailable steel floor.

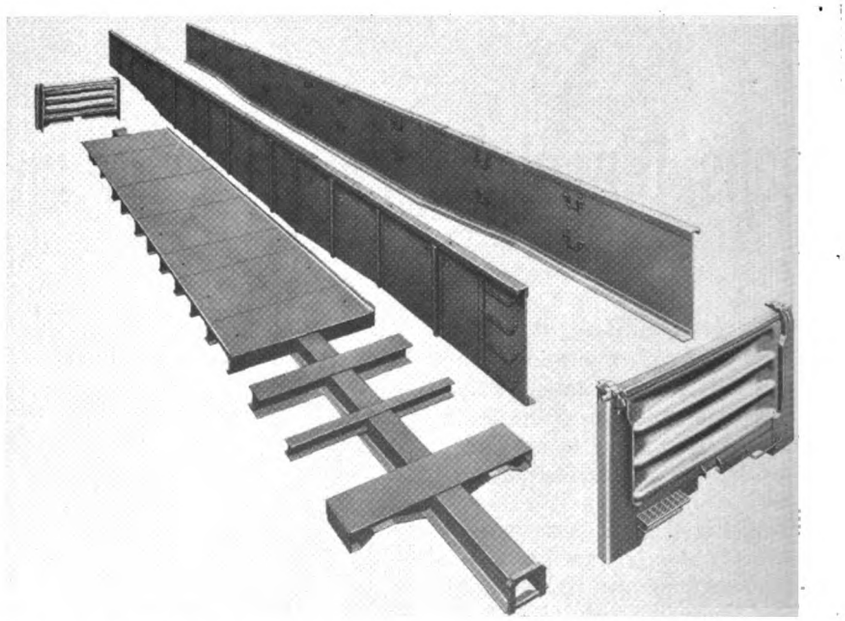
The sides are fishbelly design for maximum strength. The side sheets are 1/4-in. steel plate, and can be furnished in heights to suit requirements. There are 16 side posts per car, of 3/8-in. steel plate, located at the bolsters and crossbearers and with a wider section than conventional posts for increased support. In addition, there are 12 side posts of 5/16-in. plate at the crossties.

Either drop ends or fixed ends are available. The drop ends are 3/8-in. plate, with 4-in. deep corrugations. The corner posts are 1/2-in. pressed plate.

There are 32 inside stake pockets per car, 1-in. diameter steel, hinged to fold down out of the way when not in use. Included also are 64 hold-down clips welded to the outside of the side sheets, all located to meet AAR requirements.

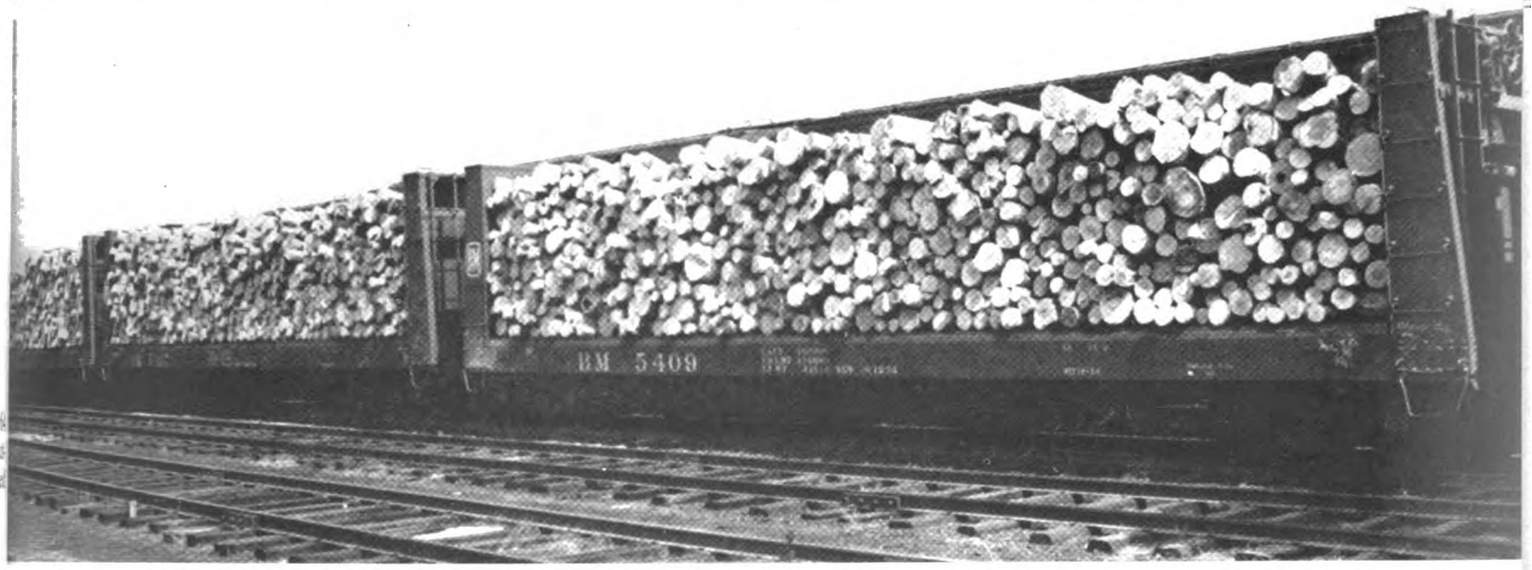


This 52-ft 6-in. PS-5 gondola and its longer mill-type companion have sides with inside height of 3-ft 6-in., but higher-side designs have been made.



Floor of the basic PS-5 is composed of steel plates assembled over the pressed-plate and I-beam crossties and over the six built-up arc-welded crossbearers.

	GENERAL DIMENSIONS	
	Basic 70-ton car	70-ton mill type
Length inside, ft-in.	52-6	65-6
Length over strikers, ft-in.	54-6	67-6
Length between trucks, ft-in.	43-6	56-6
Width inside, ft-in.	9-6	7-9
Height inside, ft-in.	3-6	3-6
Inside collapsible stake pockets	32	40
Hold-down clips	64	80
Drop ends	3/8-in. plate 4-in. corrugations	3/8-in. plate 4-in. corrugations



B&M 50-ton pulpwood cars feature all-welded underframes and bulkhead units. Bulkhead can either be riveted or welded in place

B & M Pulpwood Cars Use . . .

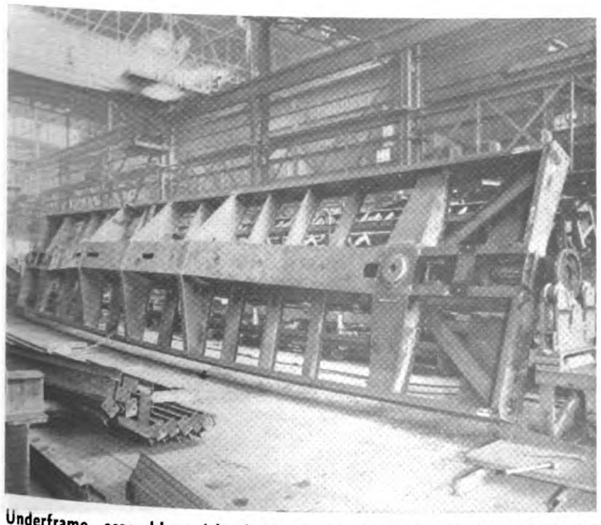
Prefabricated Welded Assemblies

The Boston & Maine has eighteen 50-ton pulp-wood cars, assembled at Concord, (N.H.) shops by B&M shop forces which have been in service 30 months. These cars utilize fabricated underframes and bulkhead components of all-welded construction.

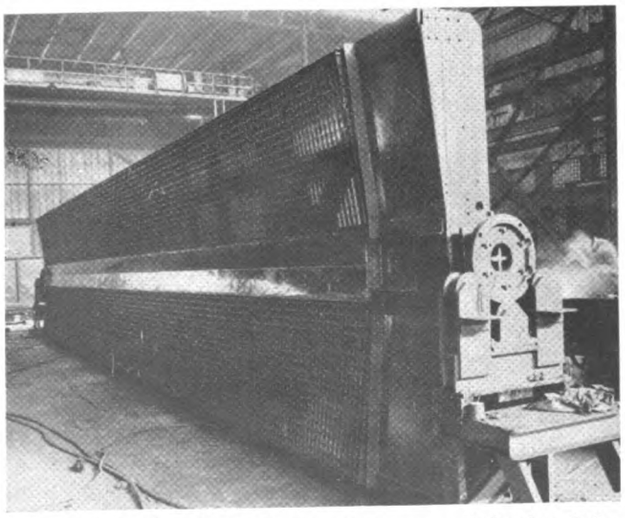
There were no written specifications for the job. The cars were designed by the Railway Division of International Steel Company, jointly with the mechanical department of the B&M and prospective shipper-users. All cars are B&M operated, and are used to haul hardwood billets from the forest to processing centers.

Due to the small number of cars on the order, there was no production line set-up, and no special welding jigs built. Underframes were made to close tolerances by simple welding fixtures to maintain necessary dimensions required of the assemblies.

The underframe was fabricated as a unit, with the center sill assembly constructed first, to which was added the crossbearers, bolsters, side sills, floor stringers and flooring. A fishbelly center sill was constructed of plate web and chords. The floor superstructure was made adequate to impact forces of pulpbillets dropped from a considerable height in "grapple" loading. Decking is low-alloy hightensile steel "grid" design sloped to center of car. Cross bearers and bolsters are built-up plate construction. The balance of the under-frames consists of



Underframe assembly with fishbelly center sill features built-up plate construction. Only castings used are strikers and integral center fillers.



Completed decking of grid design allows easy self-cleaning. Roller mounting of unit facilitates positioning for welding, speeds the assembly operation.

rolled shapes. Bulkhead units are fabricated from plates and formed shapes. All rolled shapes and plates are mild steel.

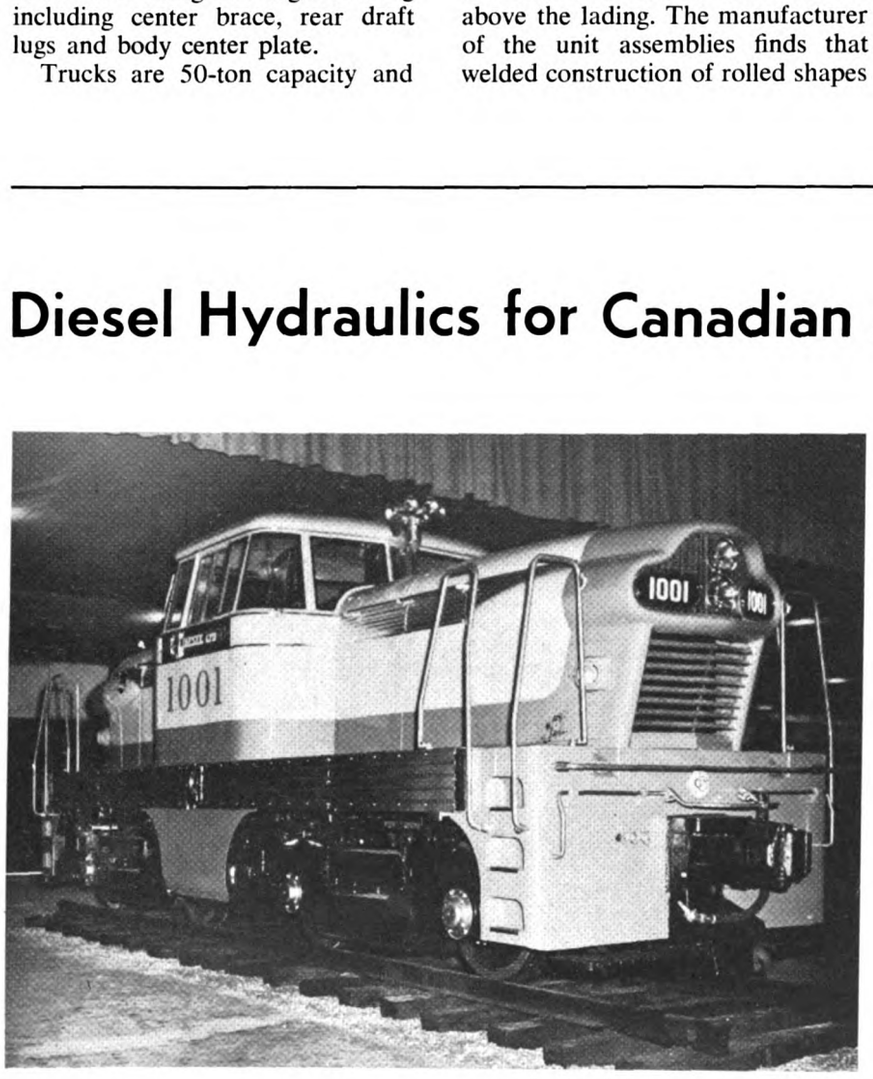
Both units were completely all-welded in the shop and shipped to the B&M for assembly. Strikers and center fillers are cast steel, with the center filler being an integral casting including center brace, rear draft lugs and body center plate.

Trucks are 50-ton capacity and standard design. Safety appliances follow the ICC code, and were designed and assembled by the B&M.

The car measures 45 ft 9 in. between bulkheads, 9 ft 2½ in. over side sills and 8 ft 2½ in. from top of floor at side sill to top of bulkhead. Capacity is 22 cords, allowing a 6-in. extension of the bulkhead above the lading. The manufacturer of the unit assemblies finds that welded construction of rolled shapes and built-up sections reduces the amount of material used, and consequently the total cost is less.

B&M officials cite these cars as another instance of superior products resulting from objective collaboration of the user-carrier-designer and modern fabricator, also greater use railroads can make of their existing facilities in assembly of rolling stock from specialized component fabrications.

Diesel Hydraulics for Canadian Market



This 600-hp diesel hydraulic switcher was developed by General Motors Diesel Limited, London, Ont. and was displayed in Toronto for the first time late last year. The unit is an experimental prototype and is powered with two GM 6-110 diesel engines driving through Allison torque converters. Its reinforced plastic hood structure shows effects of Aerotrain styling.

Canadian Pacific recently received this 500-hp diesel hydraulic switcher from Canadian Locomotive Company, Kingston, Ont. It is powered with two Caterpillar D 377-F diesels each driving through a Twin Disc three-stage torque converter. Unit has side-rod drive, is 37-ft 8-in. over pulling faces, weighs 88,000 lb and has a top speed of 35 mph. Its fuel capacity is 400 gal.

HOW TO

Learn About Air Brakes

... AND HAVE FUN DOING IT

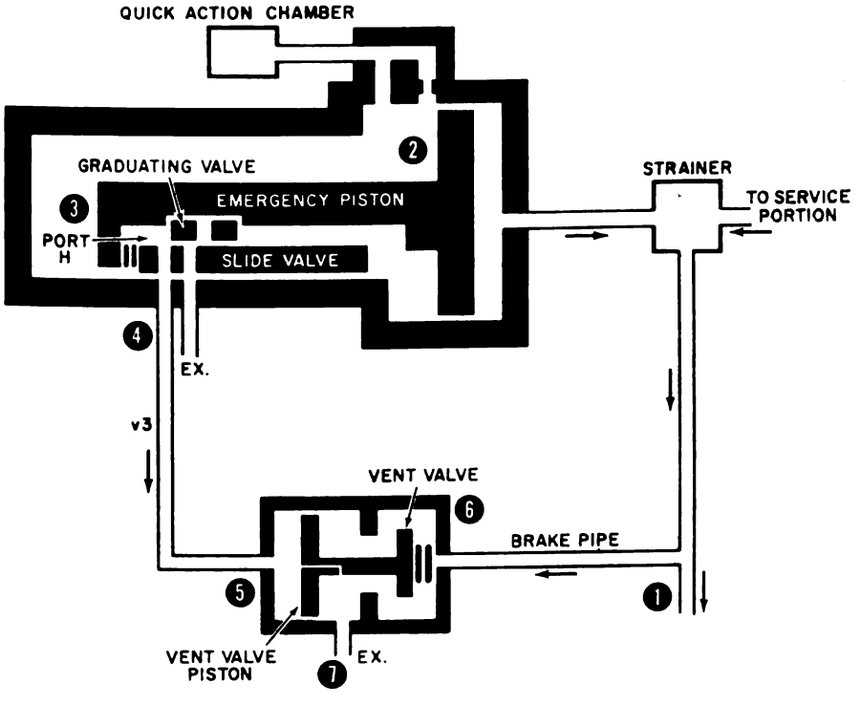
AB Car Equipment-Emergency Application

This is the third installment on the AB Equipment in the Air Brake in Color Schematics series. The first installment and the color chart appeared on page 87 of the November, 1956, issue, and the second on page 48 of the January, 1957, issue.

Starting First Stage Emergency—Sketch 12

When an emergency rate of brake pipe reduction takes place from any cause, quick action chamber air cannot flow through the vent port *v* in the graduating valve and connecting port in emergency slide valve to the atmosphere at the same rate. Sufficient differential is built up across the emergency piston to compress the emergency piston spring and allow the graduating valve to move far enough on the slide valve to uncover port *H* in the slide valve which registers with port *v3* in the seat. This allows quick action chamber air to flow to the left of the vent valve piston. This causes the vent valve to unseat, opening a large and direct passage from brake pipe to atmosphere by the vent protector.

With a heliotrope pencil, color the space at the left of the emergency piston, above the slide and graduating valves, into the quick action chamber and port, through passage *v3* into the chamber at the left of the vent valve piston. Show a light trickle of this color through the small port in the vent valve piston leading to the Exhaust. Dampen the parts colored and let dry before proceeding further. With a yellow pencil, color the space at the right of emergency piston, continue in the passage to and through the strainer, through the passage to the vent valve and color the space at the right of vent valve piston and to Exhaust. Dampen the color and let dry.



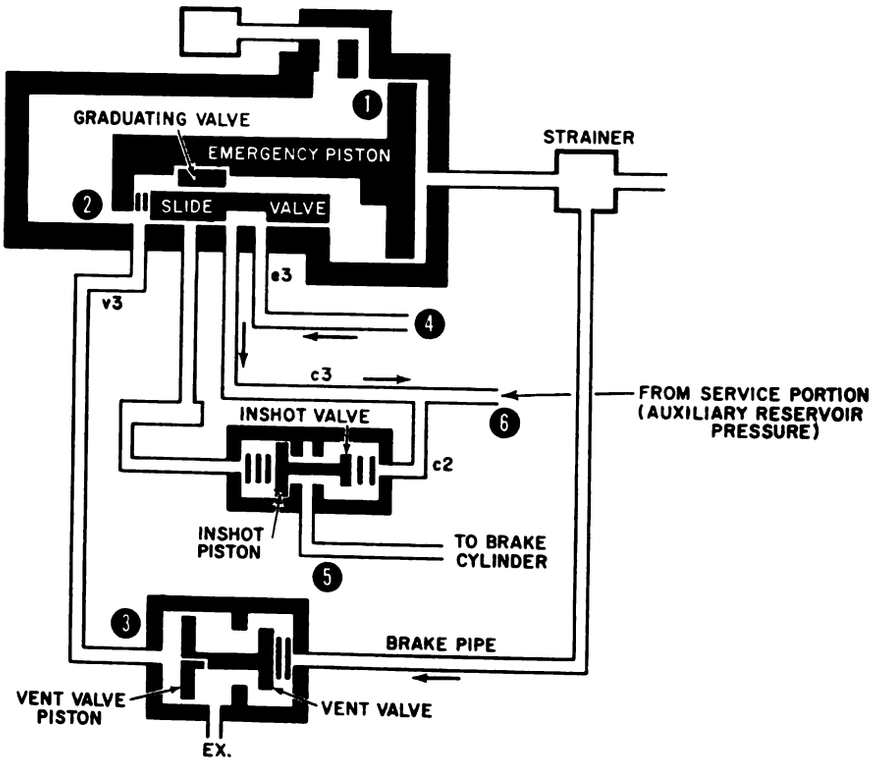
Sketch 12
Emergency Portion
Start of Emergency, First Stage

1. Emergency Rate of Brake Pipe reduction takes place.
2. Emergency Piston moves right.
3. Graduating Valve uncovers port H in the slide valve.
4. Port H connects with v3 in the seat.
5. Quick Action Chamber is now connected to chamber at left of Vent Valve Piston.
6. Piston moves to right, unseating Vent Valve.
7. Brake Pipe air flows past Vent Valve to atmosphere.

Completion of First Stage Emergency—Sketch 13

The rapid reduction of brake pipe pressure causes the emergency piston to move to the extreme right taking the slide valve with it. Slide valve port *H* is now out of register with seat port *v3* but this port is now uncovered by the slide valve so that the quick action chamber remains connected to the vent valve piston chamber. The emergency slide valve now connects ports for emergency reservoir air to flow from passage *e3* through slide valve cavity *K* to passage *c6*. It then flows through passages *c3* and *c2* into the inshot valve chamber. The emergency slide valve has blanked port *c7* leading to the inshot volume and the spring side of the inshot piston. The inshot piston spring holds the inshot valve open to allow air to flow at an unrestricted rate to the brake cylinder until approximately 15 psi. brake cylinder pressure has developed when the force of the inshot piston spring is overcome and piston moves to left, allowing the inshot valve to close.

Color with heliotrope and yellow similar to that done on preceding sketch. Dampen each color as completed and let dry before proceeding with the next color. With an orange pencil, color passage *e3* including the cavity in emergency slide valve but stop at the point where the left end of the cavity touches the slide valve seat. At this point and with a pink pencil color passages *c3* and *c2*. Continue into the inshot portion at the right of inshot piston and passage to brake cylinder. Dampen and dry.



Sketch 13
Emergency, First Stage

1. Due to rapid reduction of brake pipe pressure, emergency piston and slide valve move to the extreme right.
2. Port v3 is uncovered by the slide valve.
3. Quick Action Chamber remains connected to the left side of vent valve piston.
4. Emergency Reservoir air connected from e3 through cavity in slide valve to passages c3 and c2 to the Inshot Valve chamber.
5. Past open Inshot Valve to brake cylinder passage.
6. Brake cylinder passages also supplied from the service portion (not shown).

Emergency, Second Stage—Sketch 14

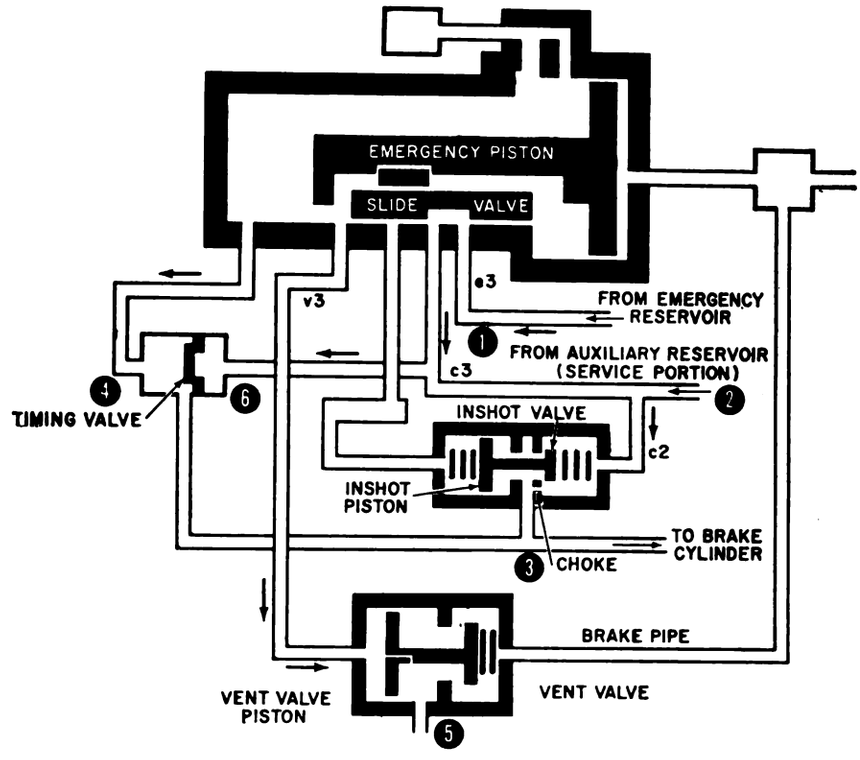
With the inshot valve now closed, brake cylinder build-up continues at a slower rate through the delay choke *127*. The duration of this delayed build-up of brake cylinder pressure is continued until the timing valve is unseated by the increasing brake cylinder pressure.

With a heliotrope pencil fill in the quick-action chamber, the space at the left of emergency piston, and the passage to and including the space at the left of the closed timing valve. Color passage *v3* and the space at the left of the vent valve piston, continuing through the vent valve piston port to the Exhaust. Dampen with a small brush and let dry. With the orange pencil color passage *e3* and the slide valve cavity to the slide valve seat. Dampen and let dry.

From the slide valve seat, color in pink passages *c3* and *c2* to the inshot valve. In the inshot valve color to the right face of the inshot piston, out of the inshot valve to the brake cylinder and back to the outside face of the timing valve. Also color in pink the passage connecting the timing valve to passage *c3*. Brake pipe pressure has by this time been depleted. However, color the brake pipe from the right face of the emergency piston to the vent valve in yellow *dashes*. Dampen and let dry.

Sketch 14
Emergency, Second Stage

1. Emergency Reservoir pressure to brake cylinder via e3 and c3.
2. Auxiliary Reservoir pressure (from service portion not shown) to brake cylinder passages.
3. Inshot Valve now closed. Brake cylinder supplied through choke.
4. Quick Action Chamber air on left side of Timing Valve.
5. Quick Action Chamber pressure reducing through port in vent valve piston to atmosphere.
6. Brake Cylinder pressure building up on right side of Timing Valve.



Emergency, Third Stage—Sketch 15

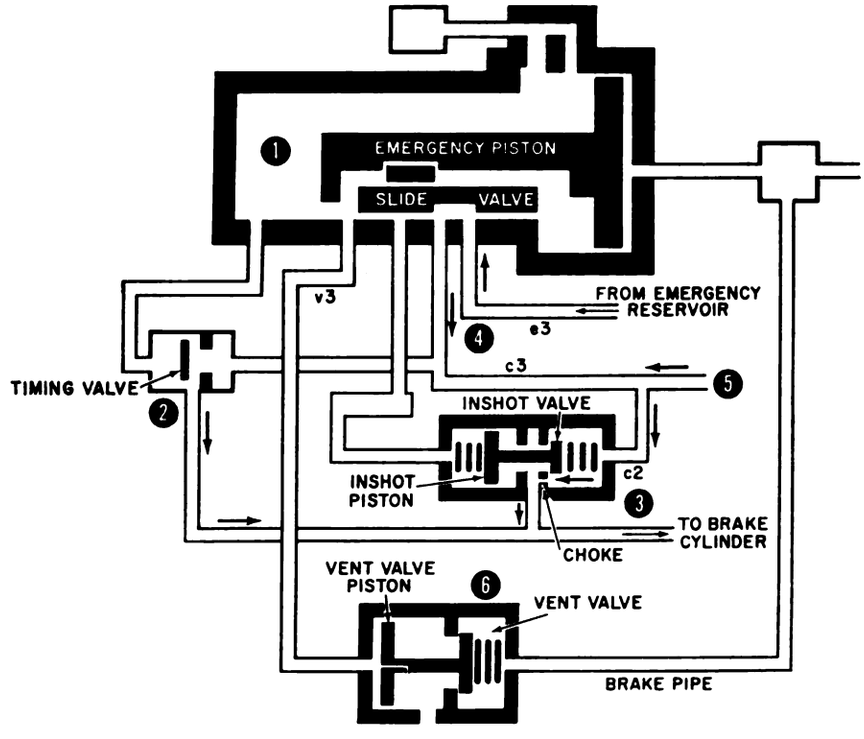
Brake cylinder pressure on the right side of the timing valve is increasing while quick-action chamber pressure on the opposite face of the valve is reducing. When the latter pressure has reduced to a certain relation to that of the brake cylinder, the timing valve will be unseated. Air can then flow to the brake cylinder through choke *153* in addition to flowing through choke *127* in the inshot valve, producing a faster rate of final brake cylinder build-up. The vent valve will remain open approximately 60 to 70 seconds at which time quick-action chamber pressure has been reduced sufficiently to permit the vent valve spring to seat the valve.

With heliotrope, in *dashes,* fill in the space at the left of emergency

Continued on next page

Sketch 15
Emergency, Third Stage

1. Quick Action Chamber Air has reduced to approximately zero.
2. Timing Valve opened by brake cylinder pressure, permitting flow of air to brake cylinder.
3. Brake cylinder also supplied through choke in inshot portion.
4. Emergency Reservoir pressure connected to brake cylinder passage.
5. Auxiliary Reservoir pressure connected to brake cylinder passage (from Service Portion).
6. Vent Valve closed by its spring, shutting off connection from brake pipe to atmosphere.



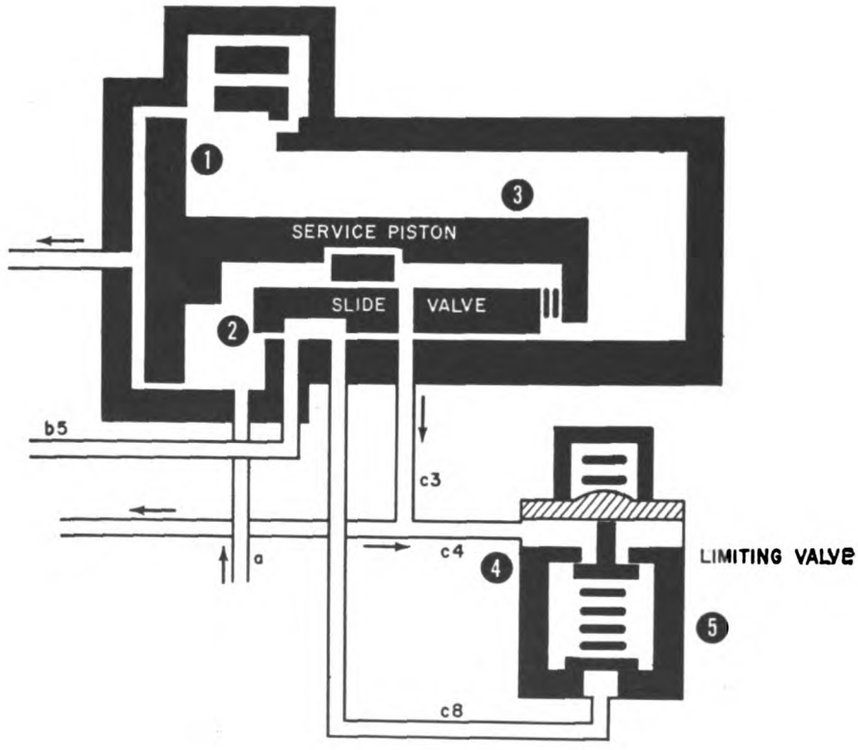
Continued from preceding page
piston, quick-action chamber and passages to the timing valve and to the vent valve. Dampen and let dry. With an orange pencil color passage *e3* and slide valve cavity as in previous sketch. After the color has been dampened and dried, continue in pink from the slide valve seat through passages *c3* and *c2* to the inshot valve, through the valve chamber, through the choke to the brake cylinder and the passage from *c3* to and through the timing valve and the passage connecting to the brake cylinder passage. Dampen and let dry. With a yellow pencil, color in *dashes* the brake pipe connections as in previous sketch. Dampen and let dry.

Service Portion Operation During Emergency—Sketch 16

The reduction in brake pipe pressure has caused the service piston and slide valve to move to the extreme left position where the graduating valve uncovers the service port *c5*. The slide valve connects *c5* for auxiliary reservoir air to flow through passage *c3* to passage *c2* combining with the flow from the emergency reservoir.

With a dark green pencil, color the space at the right of the service piston, above slide and graduating valves and out through passage *a* to the auxiliary reservoir. Do not carry the green color into passage *c3*. Make the green end at the upper face of the slide valve at the point where port *c3* is uncovered by the graduating valve (G.V.). Dampen the color and let dry. With a pink pencil and starting at the top of service slide valve (where the green left off) fill in passages *c3* and *c4*. Carry the color into the Quick Service Limiting Valve.

Inasmuch as brake pipe pressure is now lower than that of the brake cylinder, the latter pressure (shown in pink) will unseat the upper check valve and hold the lower valve closed. Dampen and let dry. With a yellow pencil, fill in by *dashes* the small space at the left of the service piston and the passage leading from it. Also color brake pipe passage *b5* (in dashes) through the cavity in service slide valve and passage *c8* to the under face of lower quick service limiting valve check valve. Dampen and let dry.



Sketch 16
Service Portion Operation During Emergency

1. Service piston moves to extreme left position.
2. Slide Valve (S.V.) connects brake pipe passage b5 to c8 to Limiting Valve.
3. Auxiliary Reservoir air past graduating valve to brake cylinder passage c3.
4. Brake cylinder air, c3 to c4 to Limiting Valve, under diaphragm.
5. Brake Cylinder pressure charges into the space between the upper and lower limiting valve check valves.

RAILWAY LOCOMOTIVES AND CARS

8,500-Hp Locomotive Power Plants

A thermal efficiency of 20 per cent and greatly reduced number of components are features of the new Union Pacific gas-turbine-electric locomotives, the first of which is about ready for delivery

By R. M. Smith,
Locomotive & Car Equipment Department
and A. N. Smith,
Gas Turbine Department,
General Electric Company

THE FLEET OF 25 GAS turbine-electric locomotives in operation on the Union Pacific has accumulated 10 million miles of operation since the first unit was delivered to the railroad by the General Electric Company in January 1952. To date, this fleet has accumulated more than 10 million miles in mainline freight service, and has demonstrated its ability to haul trains approximately 20 per cent faster than other forms of motive power.

The successful performance of the 4,500-hp gas turbine-electric locomotives, coupled with the desire for higher speed freight transportation to meet increasing competition, led to the design of a new, larger locomotive. This is a 2-unit locomotive, rated 8,500-hp for traction at 6,000 ft elevation and 90 deg F ambient.

Locomotive service is a rugged application for equipment involving almost every conceivable condition ambient. The various devices operate on a moving, twisting, and deflecting platform with possible high impact loadings. Reliability with a minimum or periodic checks, maintenance and servicing is required. In practce the equipment operates nearly as an unattended station with load demands varying over the complete range of capabilities for rather short periods of time at a particular condition.

Operating experience with the 4,500-hp locomotives in this sort of application has pointed up numerous design improvements. These have been applied to the new 8,500-hp locomotives to give higher efficiency, increased reliability and reduced maintenance.

General Description

The complete locomotive consists of three parts: the auixliary power unit, the main power unit, and the fuel tender. The wheel arrangement is 2 (C-C) and the weight exclusive of the fuel tender is 816,000 lb. The two power units, coupled together, have an overall length of 132 ft

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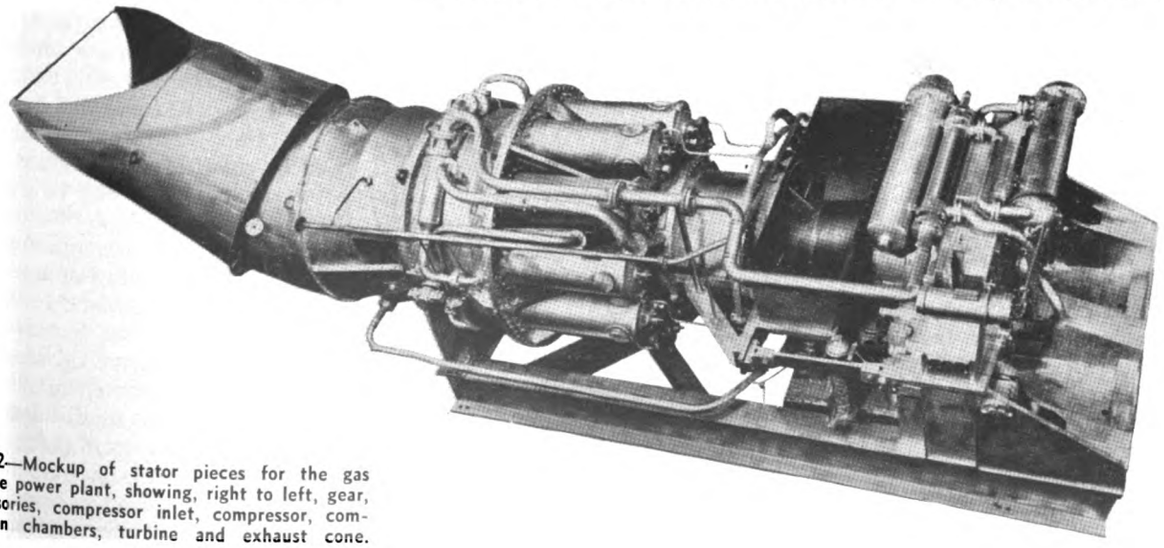


Fig. 2—Mockup of stator pieces for the gas turbine power plant, showing, right to left, gear, accessories, compressor inlet, compressor, combustion chambers, turbine and exhaust cone.

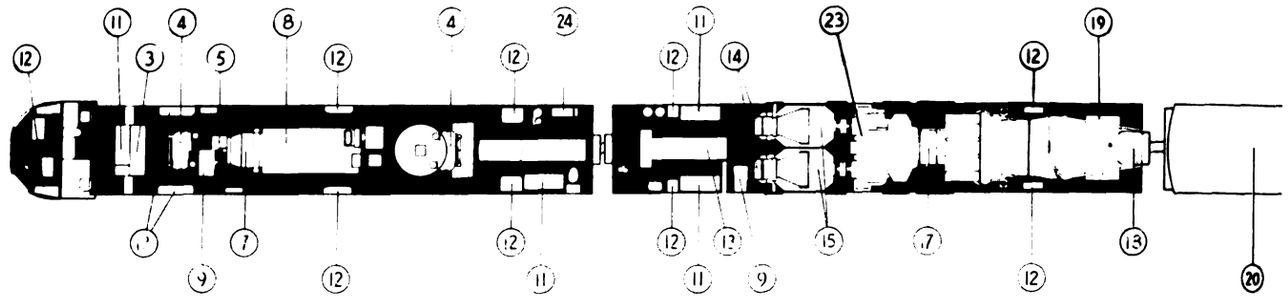
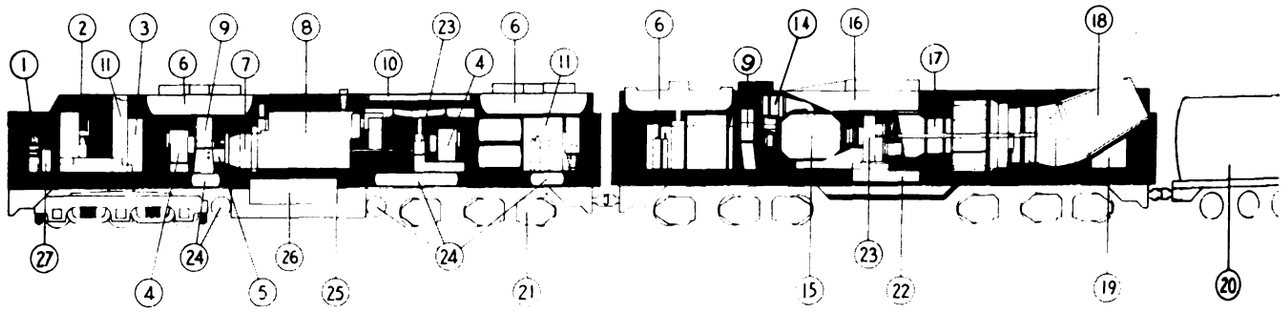


Fig. 1—Plan and elevation showing the location of principal pieces of equipment of the 8,500-hp gas turbine-electric locomotive.

1. Air-brake equipment
2. Operator's cab
3. Auxiliary control
4. Compressor
5. D-c auxiliary generator
6. Braking resistor
7. D-c generator
8. Auxiliary diesel engine
9. Traction-motor blower
10. Radiator
11. Propulsion control
12. Sandbox
13. Excitation control
14. Generator blower
15. Traction generators
16. Turbine air intake
17. Gas turbine
18. Turbine exhaust
19. Power-plant equipment
20. Gas-turbine fuel tended (furnished by customer)
21. Traction motors
22. Lubricating-oil tank
23. Gear box
24. Air reservoirs
25. Diesel fuel tank
26. Battery box
27. Train control



6 in. The cab of each unit is carried on two three-axle trucks, with all axles motored. Design of the cab structure closely follows that commonly used on diesel-electric locomotives, although the section comprising the entire length of the turbine and generators is removable for maintenance purposes.

The auxiliary power unit contains the engineman's cab and an auxiliary diesel engine, and is capable of independent operation for light movements. This six-cylinder diesel engine suppiles power for the turbine accessories and other auxiliaries, and operates continuously while the locomotive is in service. It also drives the two air brake compressors.

The gas-turbine power plant and associated equipment is contained in the second unit of the locomotive. This cab is not capable of operating unless coupled to the leading, or auxiliary power, unit. An air-driven controller was developed for turbine starting on the new locomotives. This substitutes mechanical interlocking in the form of cams for the electrical interlocking previously used, and greatly simplifies this control function.

Four traction generators are mounted, two per set, in a back-to-back arrangement with bearings at the commutator ends only. Unusual precautions have been taken to insure a supply of clean ventilating air for the generators. Each generator set is fitted with its own gear-driven air-cleaning type blower. Air from the blower is delivered to the center of the generator set, where it divides to the two machines, passing first over the rear end windings, then over the exciting field coils and armature, and finally from the commutator end of the machine.

Each generator supplies power to the three traction motors on one truck. These are connected permanently in parallel and have one step of field shunting. Each group of motors with its associated control equipment, excitation equipment, and generator is completely isolated from the others and can be cut out without affecting the remaining three groups. The traction motors are the standard GE-752 model, series-wound, 4-pole design widely used in diesel-electric, gas turbine-electric and rectifier-type electric locomotives. They are geared with a 74/18 ratio to axles mounting 40-in. wheels, giving the locomotives a maximum speed of 65-mph, and a continuous tractive force of 145,600 at 18-mph. For starting trains, the locomotive is capacle of developing 204,000 lb. tractive force, corresponding to 25 per cent adhesion.

All Bunker C fuel is carried in a tender designed and built by the railway. Fuel is pumped into the tender at an average temperature of approximately 180 deg F. Chief reliance for keeping the fuel warm is placed on the insulation of the tender tank, consisting of four in. of resin-bound glass wool. In addition, supplementary heat is provided by electric heaters supplied with power from the diesel-driven auxiliary generator, and by recirculating fuel that has been heated from the atomizing air supply. Steam lines are available for emergency wayside heating.

Cooling for the diesel engine

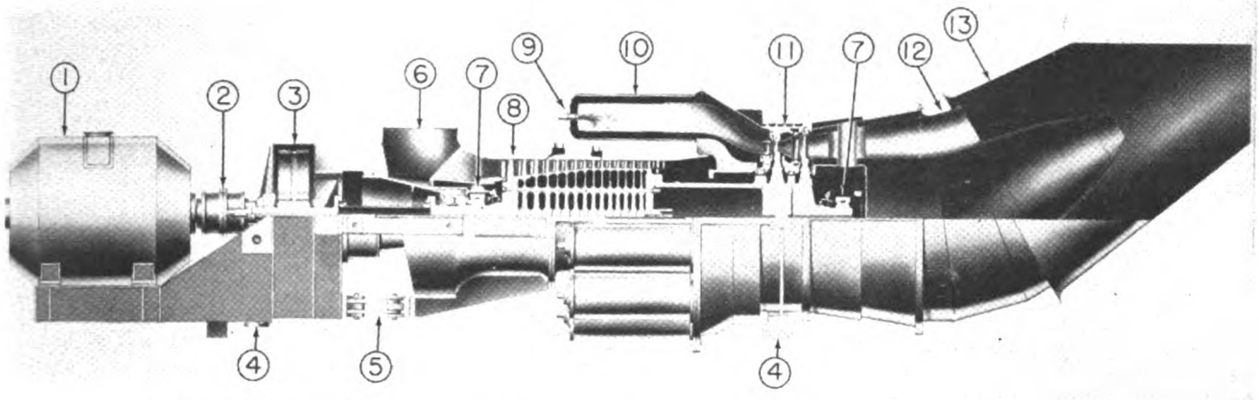


Fig. 3—Cross-section of the power plant. Note that the generators are mounted on the gear platform.

1. Traction generator
2. Generator coupling
3. Gear box
4. Support strut
5. Connecting link
6. Air inlet
7. Main Bearings
8. Axial flow compressor
9. Fuel nozzle
10. Combustion chamber
11. Two-stage turbine
12. Eductor
13. Tail Cone

jacket water and the turbine lubricating oil is provided by a conventional water-to-air radiator located in the auxiliary unit. The water systems for the turbine and diesel engine are kept entirely separate. Both sections of the radiator are cooled by a single fan, driven from the diesel engine shaft through an eddy-current clutch and right-angle gear box. Temperatures of the two systems are modulated by by-pass valves in each system.

Two air brake compressors are provided;—one driven from the gear box that also drives the radiator fan, and the other from a shaft extension on the generator at the forward end of the diesel engine. Both compressors are equipped with a disconnect feature so that they can be disconnected from the engine in case of failure.

Dynamic braking, using standard dieselectric locomotive circuits and components and designed for a peak braking effort of 147,000 lb, at 22 mph, is provided. Traction motor field excitation is supplied from the diesel-driven generator. Braking controls are self-regulating to preclude overloading the braking resistors or traction motor fields.

While the horsepower per axle is higher than on previous locomotives, definite steps have been taken to maintain good adhesion. Since all main fuel is carried in the tender, the axle loading is practically constant. The truck design and arrangement give less weight shifting than on previous locomotives. The sand capacity has been increased. A comprehensive wheel-slip equipment, which measures the speed of each axle and detect slips with equal sensitivity over the entire locomotive speed and power range, is used. The traction motors are permanently connected in parallel, thus preventing high acceleration rates on a slipping wheel.

Controls of the new locomotive are largely duplicates of those on the 4,500-hp locomotives. The same 20-notch throttle is used. Turbine starting is accomplished simply by pressing a button on the engineman's control panel. Once this button is depressed, the turbine starting sequence automatically follows through the complete cycle lasting approximately nine minutes. Completion of the cycle is indicated at the engineman's position.

The Notching Guide meter that was found of value on the existing locomotives has been retained in the new design. Otherwise, from the engineman's point of view, there is practically no difference between this locomotive and the standard diesel-electric.

8,500-Hp Gas Turbine Power Plant

This gas turbine design has evolved out of the more than a million and a half accumulated hours of operating experience with General Electric gas turbines, the locomotive experience, and the need for more than doubling the previous locomotives.

The traction generators are driven through reduction gearing from the compressor inlet end of the gas turbine. The compressor and turbine rotors are close coupled. This has been made possible by folding the combustion chambers back over the compressor. The overall length is 41 ft, and the total weight is 150,000 lb, including 47,000 lb of traction generators. The turbine speed of 4,870-rpm is reduced to 1,050-rpm for the generators by a double helical gear. This gear casing is extended to provide a platform for mounting the traction generators.

The gear-generator unit and the gas turbine are interconnected and mounted in the cab with a double three-point support arrangement. This permits relative twist between the parts while holding alignment. Two flexible legs and a key attach the turbine to the cab platform, and two flexible legs attach the gear-generator unit to the platform. A buff pin in the plane of the gear flex-legs projects into the cab platform and transmits the axial braking and coupling forces from the power plant to the platform.

The 570,000 lb per hour of air for the gas turbine is taken in at cab roof level through a duct and silencer arrangement. Entering the compressor inlet hood, the air passes through the 16-stage, axial-flow compressor where it is compressed at 95 psi, and its temperature increased to 525 deg F. From the compressor discharge, the air makes a 180-deg turn into the 10 reverse-flow

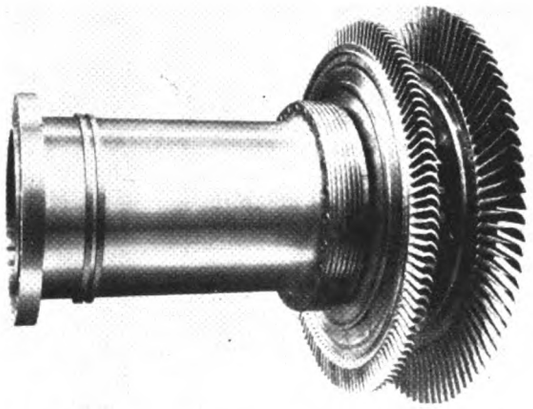


Fig. 4—Assembled 16-stage axial-flow compressor rotor.

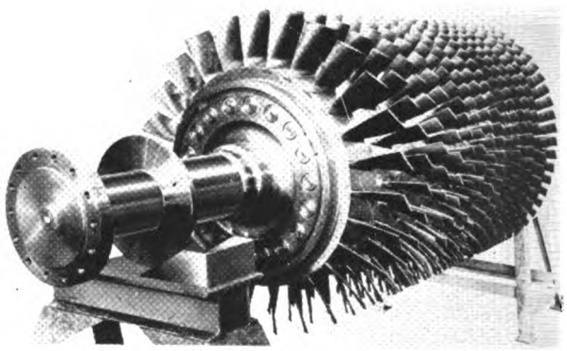


Fig. 5—Turbine rotor for the 8,500-hp locomotive, with compressor-to-turbine distance piece at left.

combustion chambers. While traveling up the combustion annulus, it enters the liner as combustion air and cooling air. The resulting hot gases, up to 1,450 deg F, flow through transition pieces into the first-stage nozzle of the turbine. Expansion through the turbine results in exhaust gases flowing through the exhaust cone at essentially ambient pressure, and at temperatures up to 825 deg F. A. thermal efficiency of 20 per cent based on the lower heating value of the fuel is expected at full load.

The compressor rotor is a stack-up of individual bladed wheels rabbeted and bolted together. The two turbine wheels are flanged and bolted together. A large diameter distance piece connects the compressor and turbine rotors. Single lock axial entry dovetails are used for the compressor blade attachment. The turbine buckets use an axial entry fir-tree type dovetail. A shank of 1.3 in. is included in the first stage bucket platform to reduce the temperature at the dovetail.

The air inlet hood passages provided for air flow from a rectangular duct flanged to an annular entrance to the compressor. The compressor casings from a cylindrical containing member for the air of a compressor. Fourth-stage and tenth-stage extractions are made to supply cooling air for the turbine stator and turbine wheels. The compressor discharge includes a large diameter bulkhead to which the outer combustion chambers are attached. An inner barrel of this discharge covers the rotor distance piece, and extends to form an inner support of the first-stage nozzle. This member is ribbed to the rest of the discharge casing.

ITEMS REQUIRING MAINTENANCE

Item	5 Diesel Units (8,750-hp)	Present Gas Turbine (4,500-hp)	New Gas Turbine (8,500-hp)
Traction motors and generators	25	12	16
Auxiliary machines	40	32	15
Relays	110	52	24
Contactors	70	54	57
Reversers and braking switches	10	4	8

The 10 outer combustion chambers have a bolted connection to the bulkhead of the discharge casing. A V-type clamp holds an end cover on this outer chamber. Fuel nozzles attach at the center of this end cover, and extend into the cap of the combustion liner. This liner cap is supported from the end cover and the one-piece, louver-type liner extends from the cap to the cylindrical portion of the transition piece. Pads are provided on the outer chambers for spark plugs, flame detectors and cross-fire tubes.

The turbine shell continues the stator structure from the bulkhead back over the second-stage buckets. Grooves are provided for the hooks of the first-stage and second-stage shroud members. The first-stage nozzle is centerline supported from the shell, and its axial load is taken in a groove of the turbine shell. Two cylindrical members, ribbed together, form the structure of the exhaust hood. Within these members, a diffusing gas path is provided and metal boots protect the structural ribs from the exhaust gases. An exhaust tailcone directs the gases out of the roof at the rear of the cab.

Both of the turbine nozzles are of welded-in partition construction. The half rings are mechanically held together. Provision is made for the thermal growth of the nozzles with centerline supporting. A diaphragm is supported from the second-stage nozzle to seal between the two turbine stages.

The two journal bearings are of the thin-wall babbit type. A tilting-shoe active thrust bearing and a plate-type inactive thrust bearing aore used. Both bearing housings are centerline supported, one in the inlet hood and one in the exhaust hood structure. The bearings are in low-pressure regions of the machine and the drain spaces are kept at a partial vacuum by means of a vapor extractor.

Compressor discharge air cools the first-stage nozzle partitions. Leakage through the high-presure packing cools the inlet side of the first-stage wheel. Tenth-stage extraction cools the aft side of the first-stage wheel, and forward side of the second-stage wheel. The nozzle and wheel cooling air returns to the gas

(*Continued on Page 78*)

Insulating Varnishes Are Vital to
Good Locomotive Performance

Proper selection and correct application of insulating varnishes are essential to long life of motor and generator insulation

WITH THE RETIREMENT OF STEAM locomotives on many major railroads a very near reality, roundhouse hostlers, locomotive crews and particularly main shop crews have had to absorb elements of electricity to keep locomotives in service. As a consequence the term "varnish" has ceased to be a description of passenger rolling stock and come to mean the resinous material vital to continued performance of diesel-electric generators and traction motors.

The importance of insulating varnishes in both generator and traction motors is often treated with a great deal more lightheartedness than it should be. The difference between reliable performance and failure at the heart of modern railroad motive power hinges on how well the impregnating varnish does its job. Since varnishes represent the pivot point for locomotive performance, the function, application problems and results expected deserve careful consideration by anyone responsible for diesel-electric maintenance and repair.

Why Are Varnishes Used?

Insulating varnishes are used to impregnate the windings of both generators and traction motors in the modern diesel-electric locomotive. The coating deposited upon the windings is expected to improve the dielectric strength of the glass cloth and mica insulation, protect the windings from abrasive dust drawn over them by the air circulating through the windings, present a barrier to moisture and oil encountered in operation, secure the wires in position relative to one another in the windings in spite of vibration, thermal creepage and torque.

In spite of the mechanical functions insulating varnishes are called upon to fulfill, the most important property by far is the dielectric strength of the film deposited by the cured varnish. The impregnating varnish is used to backstop the other motor or generator insulation during periods of overloading and voltage surges, particularly at the transition points.

In addition to a dielectric strength sufficient to allow a margin of safety at the 960-volt surges during transition, the varnish must be capable of providing a water-tight seal around the surface to both field and armature windings to prevent shorting. Besides forming a waterproof seal, the varnish used by a railroad must form a film that is physically tough, resistant to abrasion, acids, chemicals, and heat. Also, it must have enough adhesion and cohesion to prevent wires from shifting positions, causing wear on the magnet wire insulation and eventual breakdown.

Which Varnish to Use?

When considering a varnish for use in a locomotive, the considerations above must be checked against the properties of the varnish being evaluated . Generally speaking, the natural phenolic resins incorporated into a thermo-setting or cross-linking varnish will provide the optimum varnish for railway applications. In spite of the fact that some original manufacturers of railway generators and traction motors use silicone varnishes in the original insulation system, many repair shop experts feel that the natural phenolic varnishes possess better stability and exhibit superior mechanical properties.

The thermosetting property is essential for critical applications such as most railroads encounter. The varnish must be able to penetrate the many nooks and crevices between windings and between the individual wires within the windings. Then it must have the ability to cure completely in such out-of-the-way corners without the presence of oxygen—hence the use of cross-linking varnishes which set up under heat.

A varnish having the ideal properties for railway application should have a phenol aldehyde resin base, a dielectric strength of 1,800 to 2,-500 volts per mil when dry, excellent oil, water, acid and alkali resistance, and extreme toughness of film both as to cohesion and abrasion.

How Should Varnish Be Applied?

Once the proper varnish has been chosen, the problem remains of getting onto and into the equipment in the manner that will permit maximum use of its properties.

Many methods exist for applying varnish, ranging from brushing it on to coils with a paint brush, spraying, dipping in large tanks, to custom-made impregnators designed specifically for railroad equipment.

An excellent example of custom -made equipment for impregnating generator field windings and traction motor frames can be found in the Great Northern railroad's main shops in St. Paul, Minn. This is described in an article which appears on page 58 of this issue.

This method allows for thorough impregnation of field windings and eliminates the mess of cleaning up the frame, a necessary step when the frames are dipped. When the impregnation cycle is complete, the varnish is simply drained back into the reservoir tank and the frame is moved to the baking oven where it is given an eight-hour bake at 290 deg F.

Several interesting refinements are built into the Great Northern's impregnator. One is a filter system

This article was prepared by J. J. Zaleski, Sales Engineer, Irvington Division, Minnesota Mining and Manufacturing Company.

linked to the pumping system which allows all the varnish in the reservoir tank to be pumped through the filter to remove all foreign material that might contaminate the varnish.

Whatever system is used to impregnate field windings, care must be taken to remove all the air from the unit and replace it with varnish. In the case of the impregnator, this is done by holding the varnish in place for a period of time to give trapped air a chance to rise to the surface of the varnish in the form of bubbles. When varnishes are brushed or sprayed onto the surface of the windings, the removal of air is less a problem but getting the necessary degree of impregnation becomes a considerable factor. One solution sometimes used is predipping the coils before they are bolted in place in the frame and then painting or spraying the interior of the frame with a moisture barrier coat.

Nearly all armatures are impregnated by dipping them directly into varnish. Frequently this dipping operation is done in special tanks equipped with vacuum pumps which are capable of vacuum-impregnating the dipped units. Many of these vacuum tanks are also equipped with pressure systems which apply a gaseous pressure to the varnish after the vacuum has been released.

The Great Northern shops use a vacuum impregnation cycle followed by a pressure cycle of 40 psi, using CO_2 under pressure for the final cycle. The advantage of CO_2 as a pressure gas is in the fire damping ability of gaseous carbon dioxide.

Precautions Are Necessary

Once the correct varnish and method of applying it have been found, certain precautions must be exercised to assure the continued high performance of the varnish.

All units, either frames or armatures, which come in contact with the varnish should be thoroughly cleaned first to remove all dirt, grease, carbon and insulation shreds that might contaminate the varnish. Such contamination could lead to livering or jelling of the varnish, sharp drops in dielectric strength and incomplete impregnation.

One of the best methods of cleaning equipment prior to dipping is with a vapor degreasing apparatus. Those which use trichloroethylene as the cleansing solvent are judged to be best since the boiling point of this chemical is higher than that of water—which assures the operator that the vapor will boil all moisture from the unit being cleaned.

Even after the units have been cleaned, best results and trouble-free operation are further guaranteed by using some sort of filter system to remove all foreign matter from the varnish in the tank. Many filtering systems are available using either mechanical filters, screens or diatomaceous earth patties as the element to remove solids from the liquid varnish.

Frequent checks on the viscosity of the varnish will result in more uniform coating, standardized curing with the same baking time and will prevent wet spots in the varnish interior which might result in throw-out during operation.

Of equal importance with the thickness of the varnish coat and the degree of impregnation is the completeness of the cure effected by the baking cycle. Close work with the varnish manufacturer in deciding upon the best period of baking necessary for a complete cure is the safest method of assuring a complete thermosetting of all the varnish in a frame or armature. Frequently the cure time recommended by manufacturers on labels and other printed matter does not take into account the time necessary to bring the large masses of metal involved in heavy traction equipment up to the proper curing temperature.

All possible preventative measures should be taken to prevent fire explosions when working with large quantities of varnish. Most varnishes of the type suitable for railroad use contain extremely volatile solvents which are highly inflammable. Precautions against smoking, welding, static electricity and other sources of open flame or sparks should be carefully observed.

With the proper care exercised in choosing the varnish, the methods of application and in quality control of the varnish—trouble-free, long operational periods are much more likely.

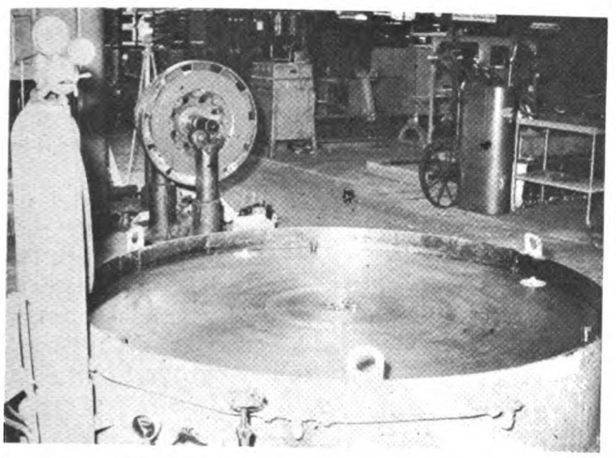
Field Frame Impregnator

All sizes and makes of generators and motors are varnished by filling on the same machine

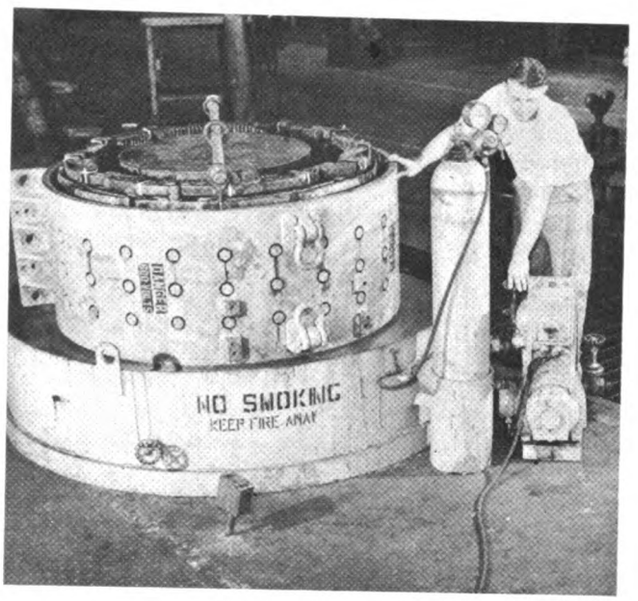
The Great Northern makes a practice of varnishing all overhauled generator and motor field frames by laying them on their side and filling them with varnish. The method has been used on motors for several years at the railroad's Dale Street Shops in St. Paul, Minn., and the practice has almost eliminated grounded fields and has not decreased motor thermal capacity.

The tank shown in the illustrations hold 250 gal of varnish and the machine plate which forms the top of the tank is 80 in. in diameter. The frame to be filled is laid on its side on the machined plate and the motor-driven pump forces varnish from the tank up through the hole in the center of the tank. To avoid pumping an unnecessarily large amount of varnish, a displacement tank is used to fill the space normally taken by the armature of generators. Only one tank is used. It is just small enough to fit the space in a D-4 generator and it occupies most of the space in larger generators.

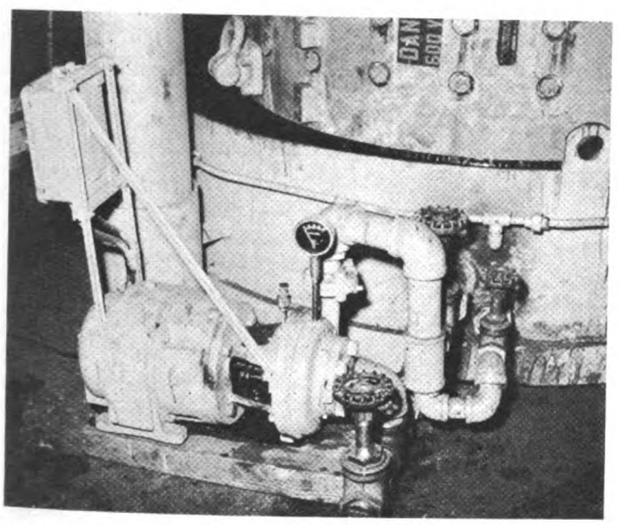
Types D-8 and D-4 generators are laid directly on the plate. The fit is sufficiently tight to allow very little seepage under the edge of the frame when the frame is full. D-12 generators have coils extending beyond the edge of the frame. This situation is taken care of by a machined ring of the same diameter as the frame and which is secured to



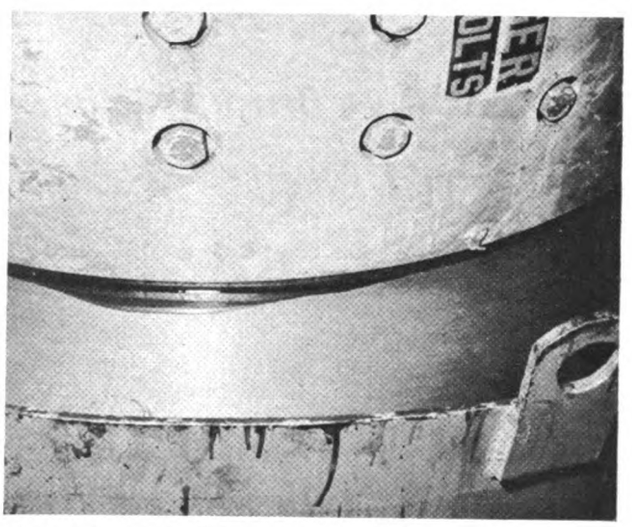
The 80-in. machined plate on which frames are varnished is kept clean between operations with Xylol.



The operator starts the filling operation. The operating handle of the dump valve may be seen at the front of the tank. ►



The 1-hp pump is used for lifting varnish into the frames and for mixing thinner and varnish.



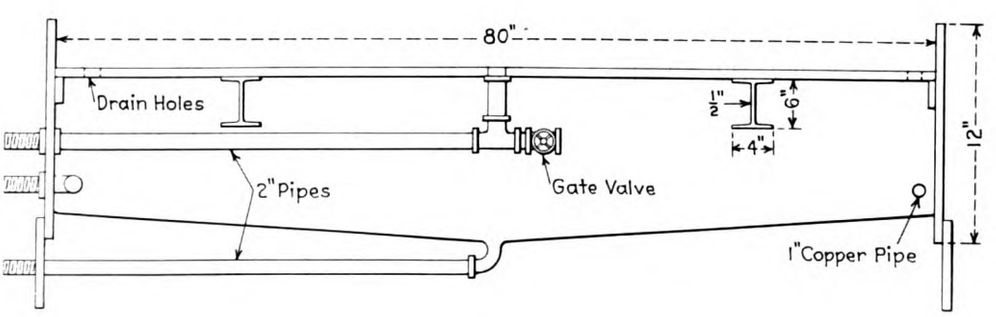
When a frame is full only a small amount of varnish seeps out under the edge of the frame.

the lower edge of the frame by screwing four plug screws into the frame holes. There are four corresponding holes in the ring. The ring holes are countersunk, and four flat head screws are placed in the ring holes and screwed into the inner threads of the plug screws in the frame.

When a D-12 generator is lying on the plate, the compensating coils protrude above the edge of the frame and cannot be insulated by filling. Varnish is brushed on to these coils.

Motors to be varnished are placed on the plate with the commutator end down. Neoprene foam rubber rings are used as a seal between the motor and the plate. Spring cover plates with corresponding Neoprene rubber gaskets are used to seal the commutator cover plate holes and the air openings. The lead openings and other holes are plugged with Duxseal.

With a frame in place, the one-horsepower motor-driven pump is used to draw varnish from the bottom center of the tank, out through



Section of the tank showing piping for filling, draining and mixing varnish.

the hole in the center of the machined plate. The largest frame can be filled in two minutes. When the frame is full, the varnish is allowed to stand for 15 to 20 minutes. It is then drained back into the tank through the dump valve just below and at one side of the center opening.

After the frame is removed from the plate, the excess varnish on the plate is squeezed to four holes near the edge of the plate and the plate is then wiped clean with Xylol cleaner.

To compensate for evaporation, thinner is added periodically, and thinner and varnish are mixed thoroughly by pumping from the center drain at the bottom of the tank into an annular ring of copper pipe which extends around the inside of the tank near the bottom. There are small holes in the inner side of the ring and the varnish is ejected toward the center of the tank.

The varnish is also filtered at intervals. This is accomplished by placing a filter over the center hole in the plate, pumping varnish through the filter and allowing it to drain back into the tank.

CO_2 gas is used to blanket the surface of the varnish in the tank and thus reduce the fire hazard. The gas is introduced in three places to insure coverage, since the tank is divided into three spaces by the two eye beams which support the plate.

How Much Do You Know About Brushes

How Does Brush Friction Affect Brush Performance?

USUALLY, WE LIKE to be able to define the property we are discussing but in the case of friction, it must be stated that about all we can consider are the effects of friction. It is only recently that engineers have been able to arrive at even partial agreement on a definition of friction. We know that friction can be measured in two ways, i.e., as static friction or the drag imposed by the starting in motion of one sliding member over another, and as the constant drag on two opposed sliding members in motion. There is evidence to indicate that in the latter case, with brushes, the friction changes as the current density changes. So it follows that the current level must have something to do with brush friction. Brush friction is usually greatest at zero current level. The ability to maintain a steady condition of lowest brush friction, under the varying current conditions which may be imposed on the brushes of a machine, is one of the factors which sorts the men from the boys so far as brush grades are concerned.

Assuming that we are not considering the harmful effect of contaminants on friction, high brush friction usually results in any or all of the following undesirable brush performance characteristics.

Failure of the brush to lay down a satisfactory film on the commutator, thus indirectly causes commutator wear.

Chattering or excessive self-induced vibration of the brushes, can rise to the point where the brushes will destroy themselves by breakage. If the degree of chatter is moderate, the brushes may not break but bar burning may occur. The condition may also manifest itself by excessive frequency of flashovers. These can be propagated by the ring-fire which occurs when brushes carrying heavy current loads bounce from the commutator.

Film stripping can result from excessive brush friction. It is usually recognized as raw unfilmed streaks about the commutator periphery. Stripping can also occur if the maximum commutating speed of the given brush grade has been exceeded. Today many railroads are keeping free from commutation problems by the use of brush grades which have a maximum commutating speed level sufficient to handle any rotational speed to which the traction motors or generators may be subjected.

The lowest friction level obtainable is considered to be the most desirable. However, the need to balance brush life, commutation, and friction at optimum levels for a given application is responsible for the progress typified by new brush grades. The value of the "let's try this and see what happens" approach to brush development disappeared long ago. This approach is one of desperation engendered by lack of scientific facts. As brush technology progresses, we learn the ability to compensate for slightly higher brush friction in a grade by depositing a film on the commutator which prevents excessive wear or damage.

Since the problem of copper dragging on commutators will be dealt with as a separate question, mention is made here only that there is evidence which indicates that in some cases, the condition is caused by excessive brush friction.

Under certain conditions, it may be desirable to utilize the properties of a brush with higher than normal friction. An example would be in the case of units operating continuously in the presence of contaminating atmospheres. Even then the entire motor or generator is not equipped with these brushes. Usually only one negative stud of a generator is changed to the "cleaner" brushes; for motors one positive stud can be used. The cleaner brushes serve to provide a gentle scouring action which removes the corrosive film that would otherwise prevent the regular brushes from commutating the machine properly. Cleaner brushes should not be placed in the positive holders of a generator. The application of cleaner brushes should be considered a last resort measure.

BY K. R. MATZ
National Carbon Company

This is the fifth of a series of questions and answers which are appearing each month.

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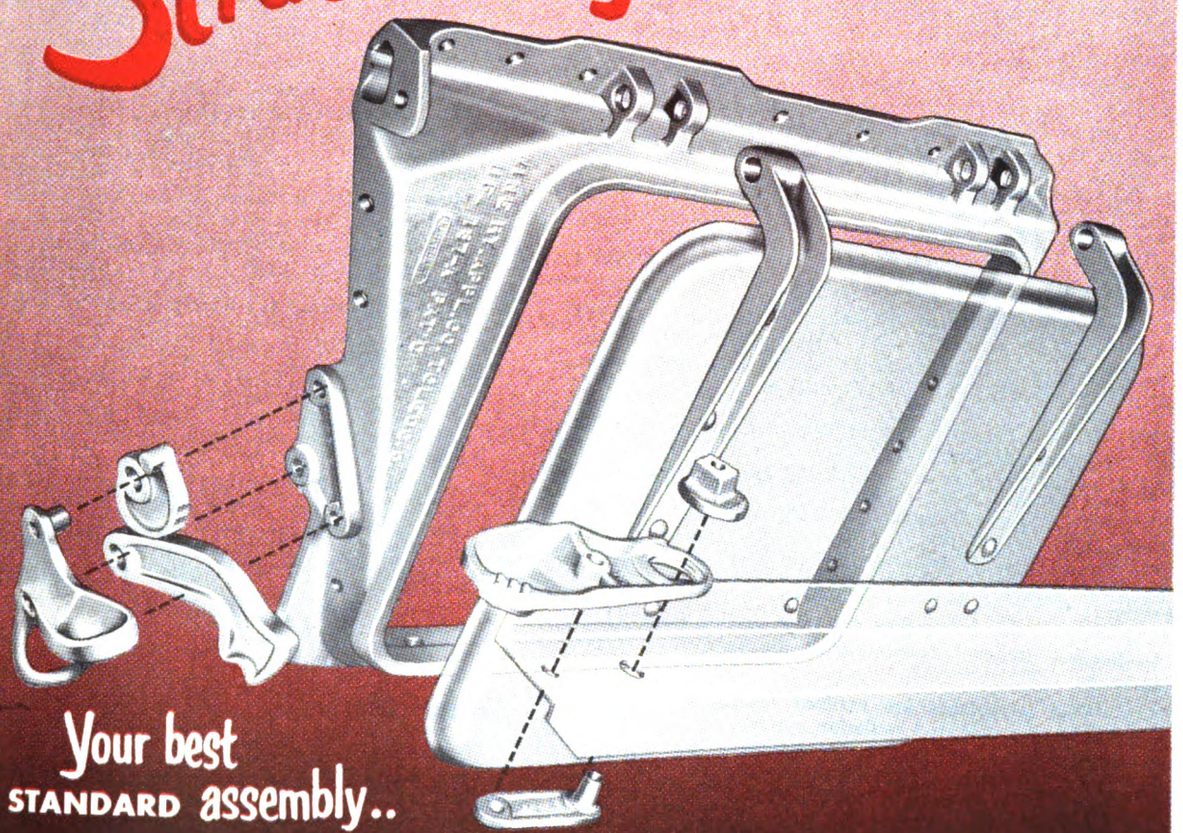

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QUESTIONS and ANSWERS

24-RL Brake Equipment

This is a new series of Questions and Answers pertaining to recent developments in the 24RL air brake equipment for road locomotives. The first questions will deal with the Pressure Maintaining feature. Authorized persons may obtain information on this subject in Instruction Pamphlets 2606-1, and 2601-1 Supplement 1 by communicating with their nearest Westinghouse Air Brake representative.

R89-Q—What is the connection between the maintaining cut-off valve and the first service cock assembly with the DS 24-HMC brake valve in the LAP position?
A—Passage *14a* (feed valve pressure) leads to the maintaining valve in the equalizing portion, and has a left hand connection leading into the first service cock assembly and to the chamber over check valve *887A*.

R90-Q—What pressures are separated by this check valve in the SERVICE LAP position?
A—The feed valve pressure above, and the brake pipe pressure below, via passage *14*, through the rotary valve to passage *2* to brake pipe.

R91-Q—How does this compare with the D-24 M brake valve?
A—The D-24 M brake valve does not have this check valve and there is no connection through the rotary valve to passage *14* in SERVICE LAP position.

R92-Q—What is the advantage in using Pressure Maintaining on long grade braking?
A—It minimizes the number of brake applications.

R93-Q—What benefit is there in holding a brake application throughout a grade?
A—A minimum of air is used, since it is only necessary to maintain against brake pipe leakage.

R94-Q—Why is this better than the short cycling method?
A—Because frequent recharging of the equipment is not necessary.

R95-Q—What advantages are realized insofar as air compressors and cooling and radiation systems are concerned?
A—Compressor duty is greatly decreased, so that the cooling and radiating system is not taxed. The probability of moisture finding its way to the brake pipe is greatly reduced as well.

R96-Q—How does the pressure maintaining method more evenly distribute the braking effort?
A—By permitting a light brake application that can be maintained at the desired pressure throughout the train.

R97-Q—If every car in the train brakes its intended share, is brake shoe wear uniform?
A—Yes.

R98-Q—What is one indication of uniform brake application throughout the train as a result of pressure maintaining?
A—The greatly reduced amount of smoke. This is usually heavy at the head end during short cycle braking of heavy trains.

R99-Q—How does more evenly distributed braking affect wheel temperatures and maintenance costs etc.?
A—It should result in lower wheel temperatures, reduce the need for inspecting wheels at the bottom of long grades, and reduce wheel reconditioning in the shop.

R100-Q—Where can the dynamic brake be used with the pressure maintaining method of braking to achieve the greatest advantage?
A—On varying grades and on grades having curvatures sufficient to affect the train retardation.

R101-Q—What may serve as an aid to dynamic control?
A—Where conditions and tonnage permit braking with the slack bunched, the dynamic brake may be sufficient to control the train until all cars are on the grade.

R102-Q—What can then be done?
A—A service reduction can then be made and the dynamic brake may be varied to compensate for curvature and grade changes.

R103-Q—In most cases, what is the operating problem?
A—That of definitely controlling the speed at the bottom of the grade.

R104-Q—What is required under this condition?
A—A running release at what is now considered too low a speed, with the result that a stop is frequently necessary.

R105-Q—Why are releases with the use of pressure maintaining possible at lower speeds than those previously considered safe?
A—Because pressure maintaining establishes and holds a true brake pipe gradient.

R106-Q—When would the adverse effects of a false gradient be evident?
A—It would occur following a light equalizing reservoir reduction just sufficient to establish preliminary quick service in the AB valve.

R107-Q—What might be an example?
A—Suppose a four lb equalizing reservoir reduction is made and the brake valve handle is placed in the LAP position. The quick service feature of the AB valve will reduce the brake pipe pressure about six lb.

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

G630-Q—What are some other items?
A—The control, fuel pump and generator field buttons must be pushed in in operating cab only. Switches must be out and locked at all other control stations.

G631-Q—Name other items.
A—The engineer's reverse lever must be in the *forward* position and transition lever in the *No. 1* position.

G632-Q—What is still another item?
A—All the brakes must be released.
Items Essential in All Units of Locomotive

G633-Q—What item must be taken care of?
A—All switches in each distribution panel must be closed.

(Continued on page 66)

The New Vista-Dome Denver Zephyr

A train with many advanced features, Burlington's shiny new Denver Zephyr links Chicago with Denver and Colorado Springs. A popular Zephyr innovation is the Slumbercoach, which offers low-cost room facilities to the coach traveler. Other attractions include the Vista-Dome cars and the authentically western Chuck Wagon car.

Bethlehem wrought-steel wheels and forged-steel axles are part of the standard equipment. This continues a practice of long standing, for the original Burlington Zephyr, back in the Thirties, was also equipped with Bethlehem wheels and axles, as were others that followed.

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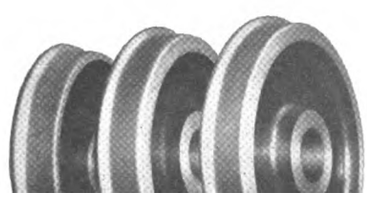

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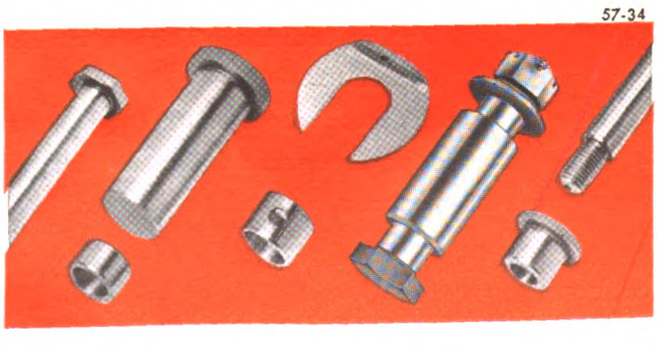

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QUESTIONS AND ANSWERS

(*Continued from page 62*)

G634-Q—What other item is essential?
A—There must be approximately 90 pounds of control air pressure on the gauge next to each distribution panel.

G635-Q—What is another essential item?
A—Fuel pumps in all units must be running and fuel flowing through sight glasses.

G636-Q—Name another essential item.
A—The engines must be running.

G637-Q—What is still another essential item?
A—The isolation switches must be in *run* position.

G638-Q—What relays must be set?
A—The ground protective relays.

G639-Q—Name another essential item.
A—The starting contactors must *not* be stuck closed.

G640-Q—What attention must be given to battery field fuses?
A—Battery field fuses in all units must be good.

G641-Q—Name still another essential item.
A—Be sure that all hand brankes are fully released.

How to Make the PCS OPEN Light Go Out.

G642-Q—What causes the PCS OPEN light to burn?
A—The PCS OPEN light is caused to burn only by an emergency or a penalty application of the brakes.

G643-Q—What is meant by a penalty application?
A—One caused by removing foot from "deadman", overspeeding, or application of train control devices.

G644-Q—What must be done to get the light to go out?
A—Make certain that the throttle is in *idle* position and then take necessary steps to fully release automatic brake.

Manual 2310 Page 506

G645-Q—What must be done, with regard to the light, if brakes are applied in service?
A—The brake valve may be placed in *lap* and left there until the light goes out.

G646-Q—What must be done if there has been an emergency application?
A—The brake valve must be lapped and then moved to *running* position before the light will go out.

Failure to Get the PCS OPEN Light To Go Out.

G647-Q—Under these circumstances, will the engines operate?
A—Engines will idle for about five minutes, but after that the engines may stop for lack of fuel.

G648-Q—Why will the engines stop?
A—When the PCS OPEN light is burning, all the fuel pumps in the locomotive are stopped.

G649-Q—If an engine stops when the light is burning, will the blue light come on and alarm bells ring?
A—No.

G650-Q—If the fuel pump is not running, what check should be made?
A—A check should be made to see if other fuel pumps on the locomotive are operating.

G651-Q—What action should be taken if all fuel pumps are stopped?
A—Items shown on Figures 5-1, 5-2 and 5-3 in this section should be checked.

G652-Q—What should be done if only the fuel pump on one unit is stopped?
A—Switch on engine control panel should be turned *on* and control and fuel pump fuses in that unit checked.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W233-Q—What do the two channels of air flow provide?
A—A fast build-up of application cylinder pressure, which quickly moves the application piston to the right, opening the application valve fully.

W234-Q—What further flow of air then takes place?
A—Main reservoir air flows to the brake cylinders, building up pressure there at the same rate the application cylinder pressure is increased.

W235-Q—How long does this flow continue?
A—Until pressure in brake cylinders exceeds that in application cylinder, when application piston moves to its final stage.

W236-Q—What insures proper operation of the self lapping portion of the brake valve?
A—When the independent brake valve handle is moved out of *Running* position into application position, exhaust valve pawl *94* on shaft *76* contacts the exhaust valve plunger and lifts exhaust valve *97a* from its seat. Thus, passage 19 from the self lapping exhaust valve *134* is provided with an opening to atmosphere regardless of automatic brake valve handle position.

Independent Application, Final Stage (Plate 7)

W237-Q—What happens as pressure builds up in brake valve Chamber F?
A—As pressure builds up in the chamber, it acts on the spring loaded piston *127*, which forms the exhaust valve seat, and moves piston 127 and the exhaust valve *134*, compressing spring *148*.

W238-Q—What further movement takes place?
A—The exhaust valve end of the floating lever moves with the exhaust valve and piston. As the lever pivots on the handle cam, application end of lever moves away from inlet valve, after which valve is closed by its spring.

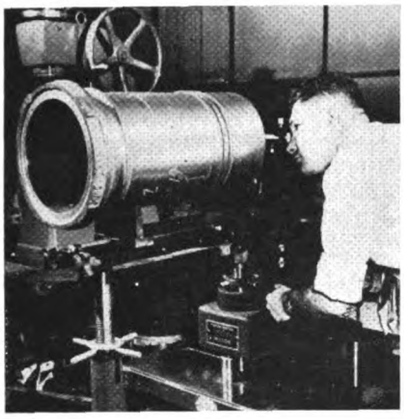
W239-Q—What function then, does the self lapping unit perform?
A—The self lapping unit quickly and accurately builds up pressure in the distributing valve release and application cylinder pipe to the level called for by the position of the brake valve handle.

W240-Q—What action has taken place in the application portion of the distributing valve?
A—The application piston moves to the left. Application valve and pilot valve are closed by springs *75* and *76*, preventing further flow of air to the brake cylinders. Slide valve *16* laps ports *e* and *d*, preventing loss of brake cylinder air, holding brakes applied until further applications or releases are made.

Independent Release After Independent Application (Plate 1)
Pamphlet 5046-15 Page 43

W241-Q—What movement takes place as the independent brake valve handle is moved toward Running position?
A—The handle cam moves away from pusher pin *139* of the self lapping unit. Lever *138* then pivots on the closed inlet valve and spring *148* moves the exhaust valve from its seat.

EQUIPMENT . . NEW IDEAS—NEW USES



(*Continued from page 8*)

varied from less than 0.04 in. per min to as fast as testing permits without influencing the results. Loads from 1 to 1,000 grams can be applied to any and all specimens under observation. Focusing the impression under the microscope is accomplished through the unit's elevating mechanism. *American Chain & Cable Co., Dept. RLC, 230 Park ave., New York 17.*

Self-Powered Ohmmeter

An ohmmeter, which features accurate measurements of low resistance values and utilizes low circuit currents, has been announced. Called Low-Ohm-Meter, Model 362, the new tester gives readings from 0.1 to 25 ohms with an accuracy of 3 per cent of the full scale value. This accuracy is attained by using the expanded scale of the suppressed-infinity shunt type ohmmeter. Another feature is its circuit current of only 5 ma maximum, which prevents damage to low-current components and promotes long battery life.

The meter is suitable for checking wiring connections, contacts, transformers, and other low-resistance components as well as in servicing electric motors and generators. It uses one, self-contained battery, type C, 1½ v, for its power source. Ranges are 0.5 ohms and 0.25 ohms. The overall size is 3 in. x 5⅞ in. x 2½ in. *Simpson Electric Company, Dept. RLC, 5200 West Kinzie st., Chicago 44.*

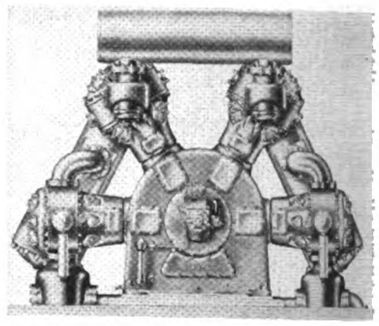
Portable Paint Sprayer

The Twin Tuffy, designed to produce high air delivery for its rated horsepower, has a ½-hp electric motor with double shaft which runs two ¼-hp diaphragm-type compressors. With delivery of 4.6 to 5 cu ft of air per min, the unit is fitted for medium production runs.

The double unit weighs 59 lb and has double handles for ease in carrying. Available as an accessory to make it more portable are wheels, an axle and handle. Base of the device acts as the base for the cart, and the wheels, axle and handle are easily assembled. Features of the sprayer include easy serviceability, large air chambers in the dome of the compressor to eliminate pulsation and assure a smooth spray, pressure valve regulator for adjustment of air, a large filter area to strain inlet air, no exposed pulleys or belts. *DeVilbiss Company, Dept. RLC, Toledo, Ohio.*

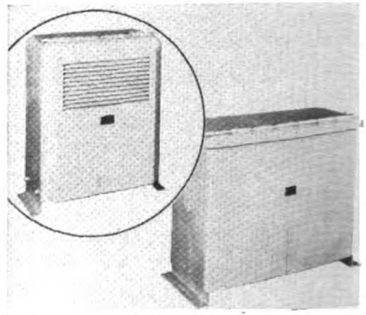
Heavy-duty Compressor

A heavy-duty industrial air compressor (350 to 1,000 hp), labelled the WN-224, is reportedly the largest package-type unit available. Its 80-125 psig output is rated from 2,418 to 6,046 cfm, depending on the horsepower. It is a four-cylinder, double-acting, water-cooled machine of semi-radial design, achieving final pressure in two stages.



There are three single and three twin unit models in addition to relative altitude sizes. Twin units are two single compressors powered by one motor. Drive may be electric, diesel engine, steam turbine, or turbo-electric combinations.

Compressor measures 9 ft 8 in. high by 12 ft 8 in. wide, type of drive and model varying the length from 8 ft 7 in. to 21 ft 11 in. Single units weigh from 26,500 to 29,400 lb. Twin units, less motor and couplings, weigh from 54,800 to 67,800 lb. *Joy Manufacturing Company, Dept. RLC, Oliver bldg., Pittsburgh 22.*



Dry-Type Distribution Transformer

A dry-type three-phase distribution transformer of new design (type DT-3) is now available. It features reduced weight and size, is quieter, and has improved appearance.

The unit uses inorganic insulation, basically silicone, and is designed for 150 deg C temperature rise. The overall volume is 25 to 51 per cent less than that of previous Class B, 80-deg C design. Weight reductions range from 17 to 32 per cent.

Mechanically-isolated core and coils reduce transmission of noise, permitting

(***Continued on page 70***)

PS-1
PS-2
PS-3
PS-4

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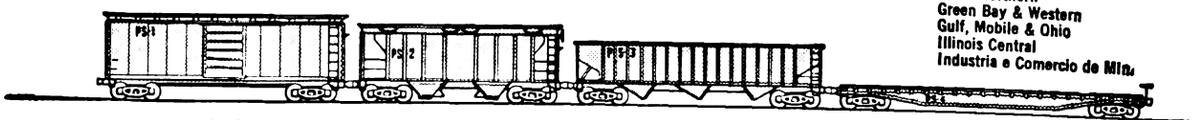

PS-1 box car, **PS-2** covered hopper, **PS-3** open hopper, **PS-4** flat car

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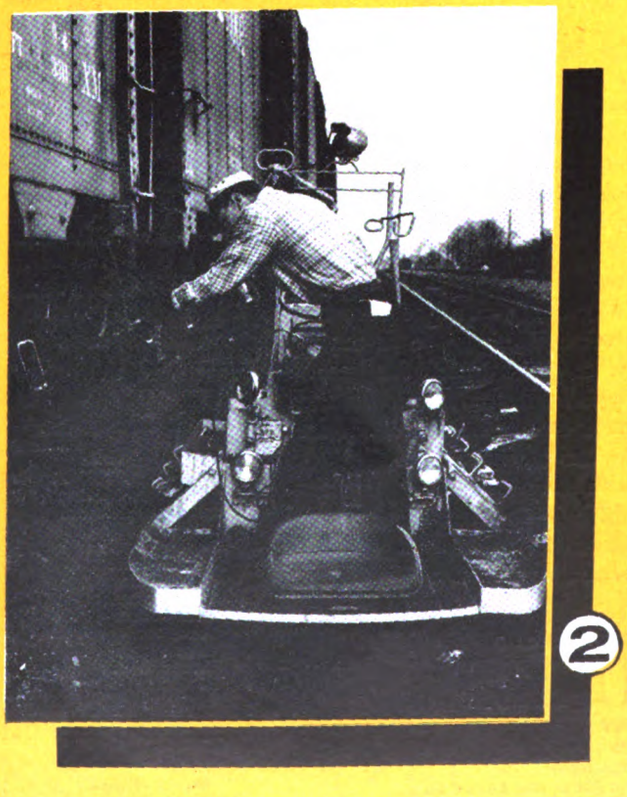
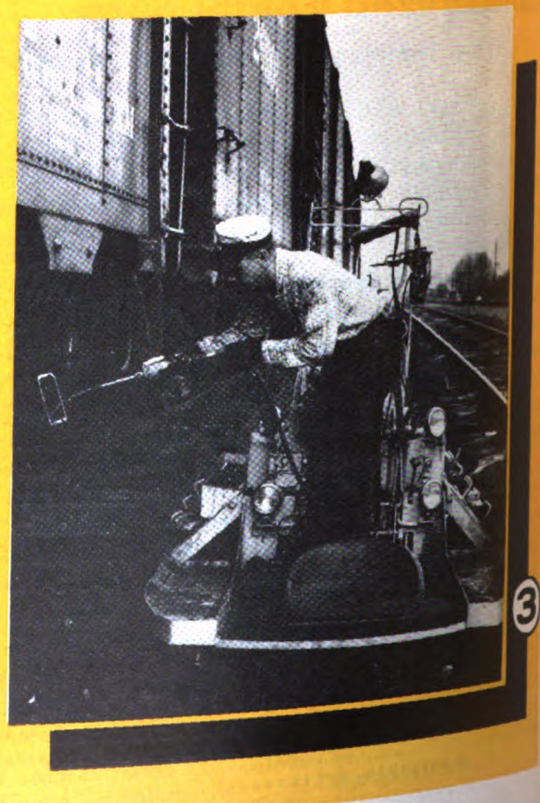




...Kershaw Leadership Enters the MECHANICAL FIELD!

The Kershaw Inspector's Cart enables car inspectors to carry a sufficient supply of car oil and packing to allow complete servicing of every journal box. In this way, he can completely service a much greater number of cars.

With the Kershaw Inspector's Cart, the inspector can carry a journal jack, basic hand tools, and a supply of brass, brake shoes and brake hose. This eliminates lost time in going back to the storehouse for parts. It also lessens the temptation of passing up necessary maintenance, and the necessity of routing cars to the rip track for minor repairs.

The Kershaw Inspector's Cart may be equipped with racks to hold oxygen and acetylene tanks, and a torch for repairing grab irons, steps and safety defects. It may be equipped with as many as five floodlights to completely illuminate work area for night operation.

The Kershaw Inspector's Cart will travel between box cars in yard areas. Side runners guide the cart between tie ends so the operator can devote full attention to inspection and maintenance. The Kershaw Inspector's Cart travels in either direction with equal ease at speeds up to 12 mph.

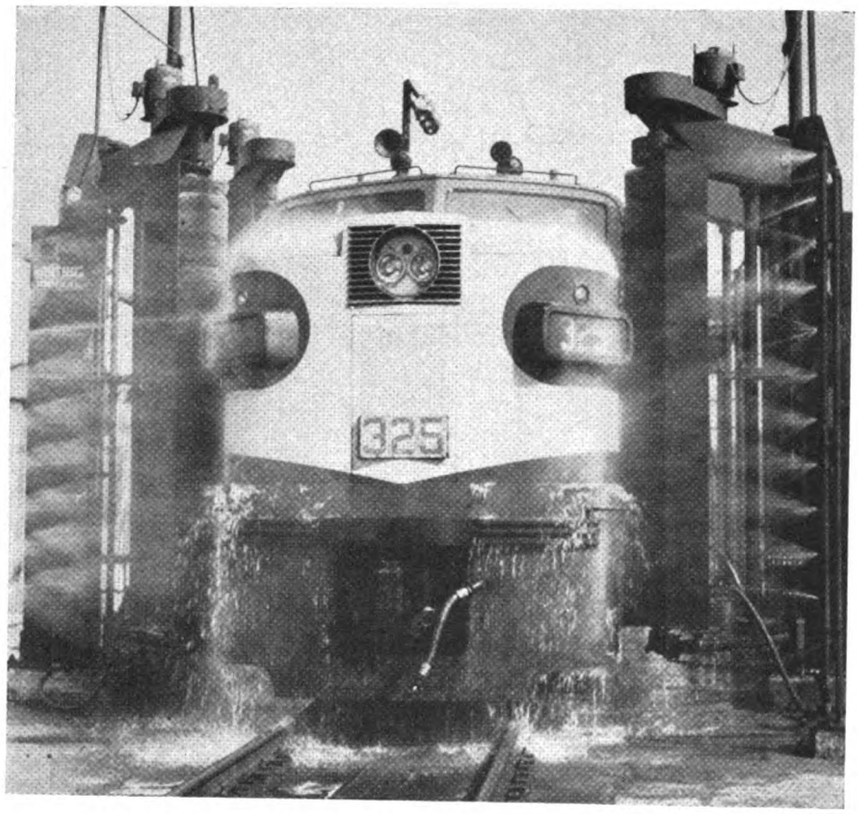
5

4

Now ...
more than ever ...
Recognize This Symbol of Leadership ...

KERSHAW
MANUFACTURING CO. INC.

MONTGOMERY ALABAMA



COMPLETE PACKAGE FOR EXTERIOR COACH AND TRUCK CLEANING

Here, in a double-barreled package is the answer to effective, yet economical cleaning of coach, car and locomotive exteriors PLUS trucks, wheels and underparts . . . both ideally suited for automatic, high-speed cleaning equipment.

FOR EXTERIORS— MAGNUS #85

This mild acidic type cleanser may be applied by automatic spray as shown above (or by brushes) to both sides and windows of cars. It cleans effectively and rinses freely, leaving a "like-new" look.

FOR TRUCKS, WHEELS & UNDERPARTS— SOLVITE TRUCK CLEANER

This heavy duty Magnus cleaner has been specifically designed for rapid cleaning of all underparts of diesel locomotives or cars. Moreover, regular cleaning with Solvite Truck Cleaner eliminates the need for laborious brushing or scrubbing. Merely spray on—rinse off.

Don't sidetrack your cleaning dollars by using out-dated materials and methods. Switch to this modern maintenance system today by writing for free information on this complete package method to MAGNUS, 77 South Avenue, Garwood, New Jersey. Or, contact your local Magnus Man; he'll be happy to work out a package to suit your needs.

magnus

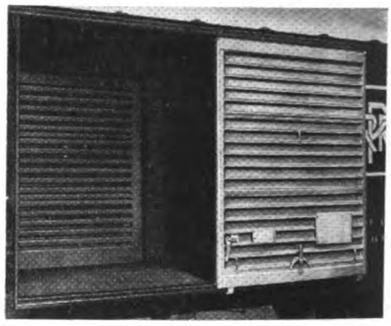
RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
—a world-wide organization specializing in cleaning and protection of all surfaces.

EQUIPMENT

(*Continued from page 65*)

connection of rigid conduit to the case without causing noise transmission throughout the conduit and mounting equipment.

All terminal boards and connections are in a compartment located in the bottom of the transformer where low-temperature conductors can be used since the air in this area is at ambient temperature. Three-phase units in either 600- or 2,400-volt class are available in ratings from 45 through 300 kva. The new DT-3 dry-type three-phase distribution transformer is shown in the circle. The other unit of previous design has the same rating. *Westinghouse Electric Corporation, Dept. RLC, P.O. Box 2099, Pittsburgh 30, Pa.*



Aluminum Box-Car Door

Welded aluminum box-car doors are going into service on the Pennsylvania. Fifty 8-ft aluminum doors are being installed on Class X46 and X52 box cars equipped with loading devices.

The weight of the 8-ft aluminum side door is 256 lb compared with 523 lb for a conventional door. An additional factor is the resistance of aluminum to ordinary corrosion. The doors are not to be painted.

Aluminum for this application is 5086, a strong, weldable alloy containing magnesium and manganese. Welded construction was chosen over riveted assembly because of the greater speed, reduced weight, lower cost, and more "unitized" product. A specially designed aluminum extrusion is used in the vertical edges, or "stiles," of these doors. These extruded members provide structural rigidity for the entire door assembly as well as edge sealing.

The door's upper edge is ⅛-in. shaped aluminum sheet, and the bottom edge is standard bottom door-section from $\frac{5}{32}$-in. sheet. The door faces are corrugated panels of three .109-in. gage aluminum sheets.

On forty of the doors standard cast-iron door rollers with lubricated anti-friction bearings were used, while the remaining ten doors, for test purposes, were fitted with Nylon rollers which do not require lubrication or anti-friction bearings.

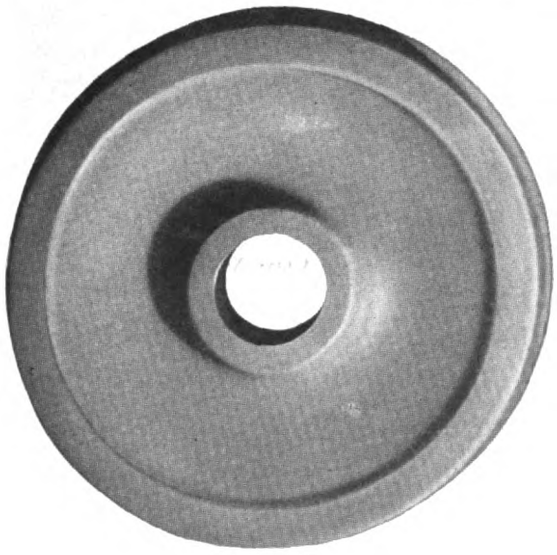
(*Continued on page 72*)

there's the QUALITY side . . .

The heavier flange and improved brackets designed into the chilled car wheel approved by the AAR in 1950 make it an outstanding performer under 40- and 50-ton freight cars.

This wheel is high in safety performance as measured by ICC records throughout the country for all types of freight car service.

look at both sides of the Chilled Car Wheel



. . . and there's the side that spells ECONOMY

The Association chilled car wheel is low in first cost, high in exchange value, reducing the dollar investment required for freight car wheels.

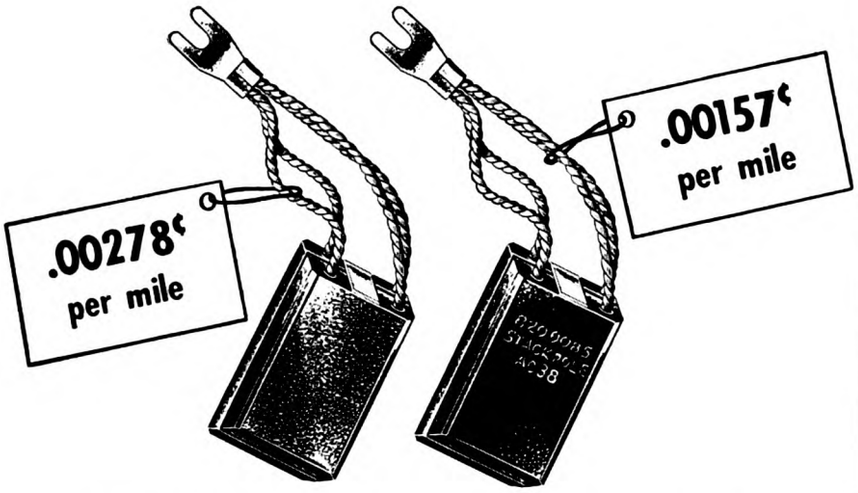
This investment is further reduced by the accessibility of standard Association wheels from 28 plants across the United States and Canada, because this means you can operate with a smaller inventory.

Where the service suggests a second look for the sake of good performance at reduced investment, the chilled car wheel warrants first choice.

in good supply
available locally
short-haul delivery
reduced inventory
low first cost
low exchange cost
increased ton mileage
high safety standards
plant inspection
easier shop handling

RAILWAY WHEEL ASSOCIATION

(Formerly Association of Manufacturers of Chilled Car Wheels)
445 North Sacramento Boulevard, Chicago 12, Ill. • Albany Car Wheel Co. ACF Industries • Griffin Wheel Co. • Marshall Car Wheel & Foundry Co. Pullman-Standard Car Mfg. Co. • Railroad Products Div., American Brake Shoe Co. • Canada Iron Foundries, Ltd. • Canadian Car & Foundry Co., Ltd.



What if brush prices included commutator reconditioning costs?

Long diesel-electric brush life is highly important. By no means, however, is it the only factor by which brush efficiency should be judged.

Let's assume that brush type A has an average life of, say, 50,000 miles. Brush type B lasts 100,000 miles. Therefore brush A requires six changes in the usual diesel reconditioning span of 300,000 miles. Meanwhile, brush B is only changed three times.

But Type A is kind to commutators! Things run smoothly the full 300,000 miles. Type B, while lasting longer, bar burns the commutator to the extent that an extra reconditioning is required before the 300,000 mile mark is reached.

Brushes cost about $12 per set versus approximately $400.00 for commutator reconditioning. Thus the result is easy to figure: *The true cost of type A brushes has been about .00157¢ per mile as compared to the 77% higher cost of .00278¢ per mile for brush type B.*

While only a rough example, such figures show why Stackpole engineering is based on the firm belief that smooth commutation is every whit as important as long brush life—and that the best brush for most uses is the one that strikes a happy medium between these two sometimes incompatible factors.

STACKPOLE

load-leader

BRUSHES

...They help keep diesels rolling ... *profitably*

STACKPOLE CARBON COMPANY, *St. Marys, Pa.*

EQUIPMENT

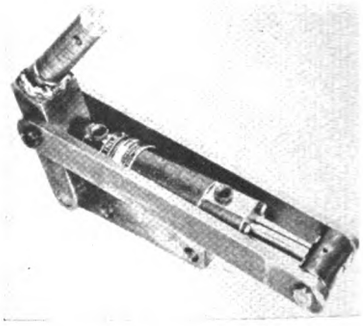
(*Continued from page 70*)

Possible electrolytic action between the aluminum and the ferrous parts is prevented by a coating of zinc chromate primer on the aluminum and of non-lead-bearing primer on the steel and iron. A layer of Alumilastic paste is also applied prior to joining the dissimilar metals.

The field experienced gained through daily use of these 50 doors will be supplemented by accelerated service tests of several doors in a commercial laboratory. Kaiser Aluminum & Chemical Sales, Inc., Dept. RLC, 919 North Michigan ave., Chicago 11.

Blowgun

The Safe-T-Air blowgun has been designed for the clearing of working surfaces and parts of waste cuttings, dust and particles. According to the manufacturer, 40 per cent of the air intake forms a protective screen whenever the trigger is depressed. This shields the operator from any flyback whenever the gun is used. Complete protection is afforded against flyback without use of safety goggles or masks. *E. V. Nielsen, Inc., Dept. RLC, Stamford, Conn.*



Double Acting Hand Pump

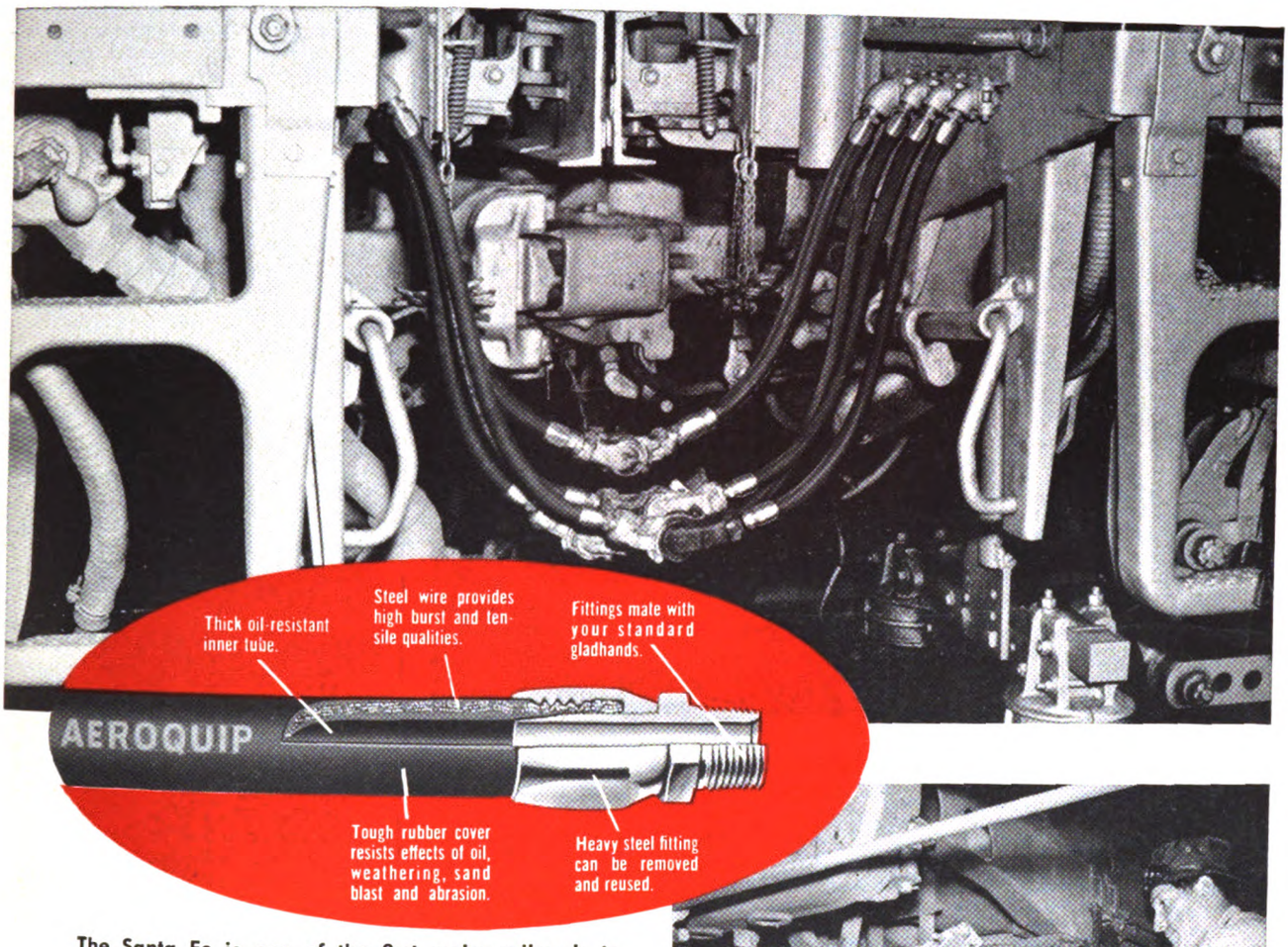
A double-acting hand pump, Model 1687, for 10,000 psi hydraulic pressure, provides more than three times the maximum capacity normally used with a constant leverage hand pump for the same pressure.

This variable leverage hand pump, designed primarily for cranes, stackers and winches, has a patented internal toggle linkage, and a capacity of .475 cu. in. per 2-stroke cycle. The handle normally used is a 28-in. length of ¾-in. pipe and can be moved through a total arc of 72 deg, but is ordinarily operated through half that distance. At 10,000 psi, the left hand portion of the stroke is used for a 3.5 to 1 advantage.

According to the manufacturer, when lifting loads at lower pressures in material handling applications, the right hand portion of the stroke would give better than three times the usual speed. *Mechanisms Company, Dept. RLC, 118 E. 2nd St., Uhrichsville, Ohio.*

(*Turn to page 74*)

New Aeroquip Air Brake Hose Lines Cut Replacement Costs For Santa Fe R.R.



The Santa Fe is one of the first major railroads to utilize Aeroquip air brake hose lines for replacements on diesel-electric locomotives and passenger cars. It is estimated that savings will amount to many thousands of dollars a year. Here's why:

(1) Aeroquip fittings are detachable. They may be used again and again for making new hose lines.

(2) With Aeroquip, inventory may be reduced to several coils of bulk hose and a few fittings. Hose lines can be made quickly by cutting the hose to length and attaching the fittings. Only ordinary shop wrenches are needed.

Cut costs! Save time! Start using Aeroquip air brake hose lines as soon as possible. Write for complete information today.

Aeroquip

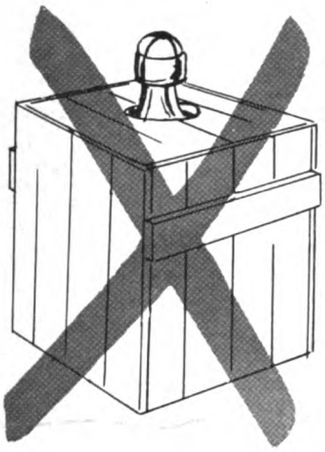
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

The NEW way to remove RUST • SCALE



Here's a new Oakite development that handles like a powder yet works like a liquid to remove rust and scale—it's DRYCID!

Oakite DRYCID comes in powder form. This makes it easy to handle, easy to store. Mixed with water it offers the most convenient way to clean out clogged generators, condensers and sub-cooler coils. Solutions are circulated with your regular water pump. No special pumping equipment needed.

Inhibited Oakite DRYCID removes iron sulphides, rust and other metal oxides at room temperature. Its action is 3 to 4 times faster when used at 140° to 160°F. Objectionable fumes and odors are eliminated.

DRYCID is the latest example of Oakite's endeavor to bring you low-cost end results in all your maintenance cleaning operations. For complete details write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE®
MATERIALS · METHODS · SERVICE
SCIENCE

...gives you the important advantage—low-cost end results

RAILROAD DIVISION

EQUIPMENT

(*Continued from page 72*)

Extra Long Drills

These longer than regular drills are available in high-speed steel with straight shank; wire gauge sizes No. 52 through No. 1 and fractional sizes 1/16 through 1/2 in. The taper shank size range is 1/8 through 1½ in. Lengths go to a maximum, of 18 in. in the regular size range. *Chicago-Latrobe, Dept. RLC, 411 W. Ontario st., Chicago 10.*

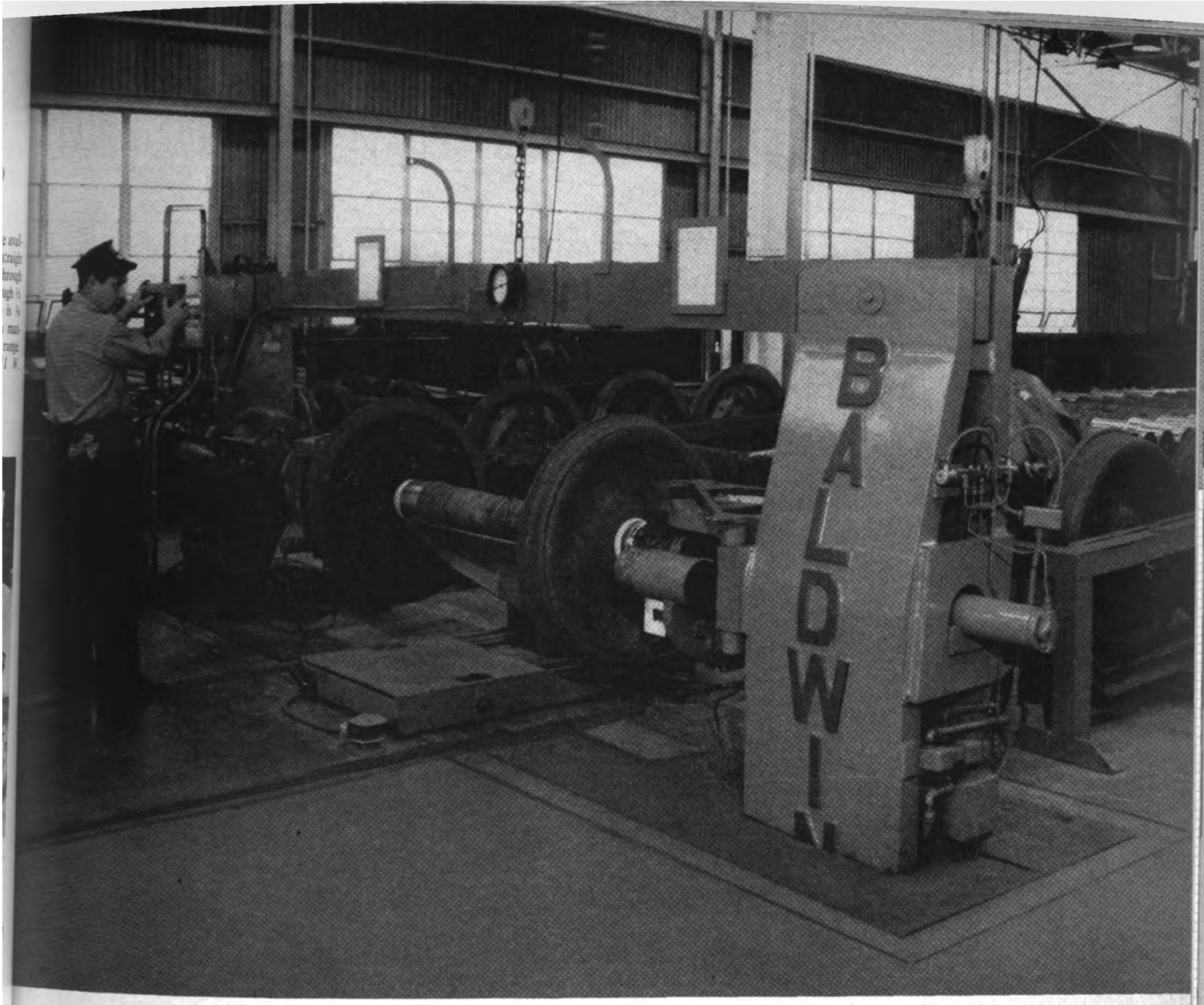
Battery Shipping Container

The Palletainer is used for shipment of passenger car and deisel locomotive batteries between points on railroads. The container has also been furnished by railroads to battery manufacturers for shipping purposes, saving crating costs, with the railroad getting credit for furnishing the container. According to the manufacturer and pressent railroad users, previous methods using crates and cartons have been unsatisfactory, due to breakage in transit.

Constructed of low carbon steel wire, 0.306 and 0.262 gage, electrically welded throughout, the container will hold four trays of 25-plate four cell batteries, each separated from the other by a divider, welded at bottom and back panel. The front panel, hinged at the bottom, provides ease in loading and unloading. A removable front panel can be furnished.

The top cover is hinged at the center and back, and lined on the inside with ¼-in. Masonite. Two-inch by four-inch blocks fastened on the inside of front and rear panels hold the batteries in place and prevent excessive jarring.

The Palletainer is handled with a fork lift truck, and is easily stacked for handling and shipment. It can be furnished in various sizes, the 34 in. by 54 in. by 22 in. being the most popular. Its approximate weight is 245 lb. *Union Steel Products Company, Dept. RLC, Albion, Mich.*



Baldwin wheel press assembles wheel sets in as little as 2 minutes

Baldwin and Niles railroad tools are cutting shop costs drastically in the nation's leading railroads. The wheel press pictured above, recently installed in Seaboard Air Line's new shop at Hamlet, N.C., can assemble wheel sets in as little as 2 minutes. Axles and wheels are supplied by gravity racks to the press, which can be fed by one man. One assembly man and a press operator are all the manpower required to process the sets.

The Baldwin wheel press also eliminates substantial installation costs. Due to the fact that the carriage has its own built-in elevator, the machine can be accommodated by a pit only 6 in. below the floor line—in contrast with pits 6 or more ft. deep required for conventional equipment. Other efficient B-L-H railroad machine tools in operation at Seaboard's Hamlet shop include a new Niles wheel borer with sidehead, a Niles wheel lathe, and a specially designed Niles axle turning and burnishing lathe.

Write today for detailed information on B-L-H railroad machine tools.

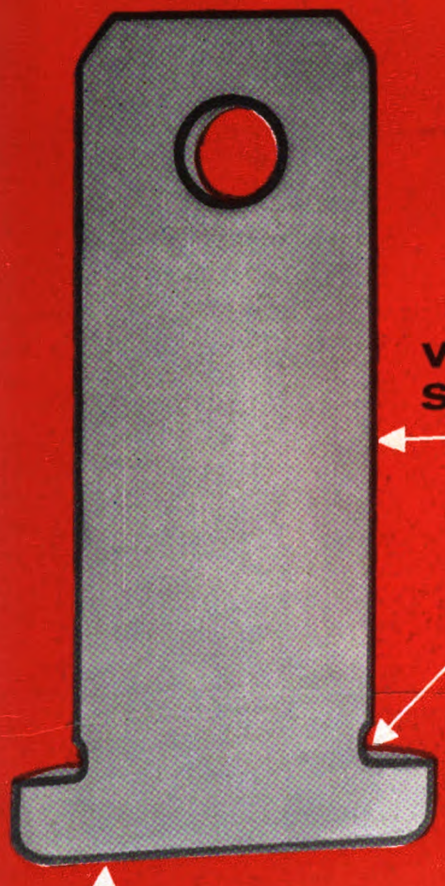
Hamilton Division Hamilton, Ohio

BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

BALDWIN BLH LIMA-HAMILTON

COMMERCIAL QUALITY



1/32" WEARING SURFACE

HARDENED FILLET

HARD, BRITTLE HEAD

ELECTRO-MOTIVE QUALITY

1/8" WEARING SURFACE

FILLET NOT HARDENED

TOUGH, DUCTILE HEAD

Commercial Bushing

Electro-Motive Bushing has double the wearing surface

Longer lasting . . . cost no more!

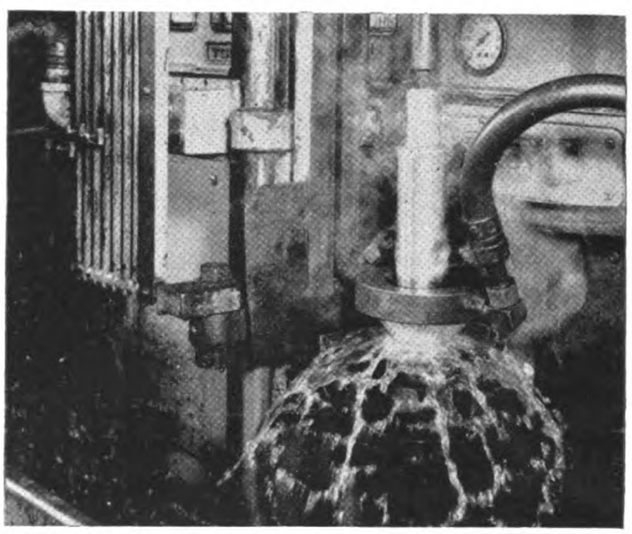
Why Electro-Motive Pins and Bushings cut replacements costs

Compare the photographs at left and you will see why Electro-Motive Pins and Bushings—on depth of wearing surface alone —will give you much longer service life.

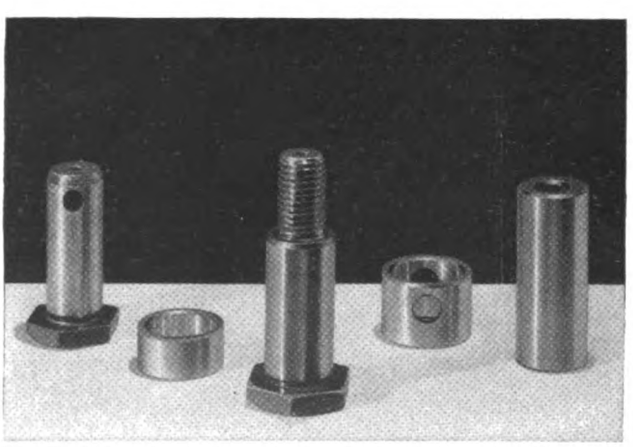
Note on the Electro-Motive Pin the wear-resistant surface runs only on the shank. This is purposely done because a pin must perform two functions: provide a bearing surface for the bushing and withstand severe shocks both from installation and service.

Thus, on the Electro-Motive Pin, the shank has a hard, deep bearing area while the head and threads are left ductile for better shock absorbing qualities, longer life.

Make a comparison in your own shops. Ask your Electro-Motive representative for a sampling of EMD Pins and Bushings for inspection and testing. You will see why the special hardening process employed in the manufacture of these parts brings extra service and savings at no extra cost.



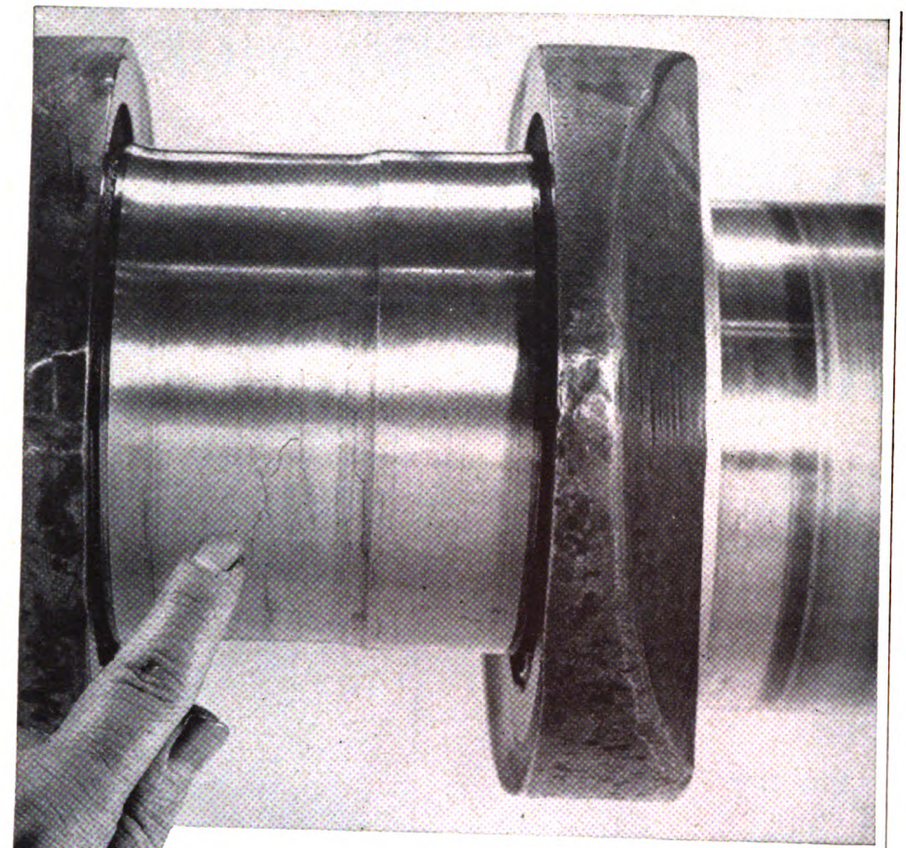
Induction hardening makes the difference. In the induction hardening process, pins are passed through a high amperage electric induction coil which quickly heats them to optimum temperature. Water spray quickly quenches to eliminate distortion and scale.



Fast delivery from nine on-line warehouses. All nine of our warehouses carry stock of these pins and bushings in both current and fast-moving classifications.

La Grange, Illinois
Jacksonville, Fla.
Minneapolis, Minn.
North Salt Lake City, Utah
Los Angeles, Calif.
Halethorpe, Md.
Robertson, Mo.
Ft. Worth, Texas
Emeryville, Calif.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS
HOME OF THE DIESEL LOCOMOTIVE
In Canada: General Motors Diesel, Ltd., London, Ontario



THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-1

This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE AND ORDNANCE COMPANY

Irvine (Warren County), Pa.

8500-Hp Locomotive Power Plants

(*Continued from page 56*)

path. The air from the fourth-stage compressor extraction cools the cylindrical portion of the turbine shell, the exhaust struts and the aft side of the second-stage wheel.

Shaft-driven accessories mounted on the main reduction gear include the fuel regulator, atomizing air compressor, fuel pump, hydraulic control pump for the flow divider, tachometer and lube pump. The motor-driven accessories include a vapor extractor and a d-c auxiliary lube pump. The lube oil tank is mounted below the gear, and all of the lube oil is in this gear area except for the number two bearing.

The fuel regulator produces mechanical output signal to the fuel system. It is an electrohydraulic-mechanical device receiving a speed signal from internally contained fly-balls, pneumatic exhaust temperature signals, electric speed-setting signals, and electric starting signals. An electric signal for generator load limit is also produced.

The exhaust temperature signal is obtained from a thermostatic device that throttles compressed air as a function of temperature to produce a signal for the fuel regulator. A gear-pump system is used for metering fuel. The atomizing air compressor is of the rotary type, operating at 5,300 rpm. Several static accessories are mounted on the gear casing and lube tank cover. They include lube oil cooler, atomizing air cooler, fuel heater, lube oil filter and fuel stop valve.

Conclusion

A locomotive of this size must be able to operate consistently as a single unit; therefore, the reliability of each critical device is extremely important. In some cases, multiple-unit operation of device is desirable. For instance, two air compressors have been installed, either one of which is large enough to handle a normal size train. In general, however, reliability must be gained by reducing the number of components to an absolute minimum and making them of the highest possible quality. In addition, minimizing the number of devices will contribute toward

(*Continued on page 82*)

General Electric Locomotive Cables—

wherever environment is a problem

Sand and dust storms, pebbles that fly and cut like bullets, scalding steam, an occasional oil bath or a dousing with detergents or other corrosive cleaning compounds—these are the environmental problems you face with locomotive cables. And as long as the unit is operating, there's motion that causes either simple vibration or severe and constant flexing. You need a cable designed to take this treatment and still deliver economical service life. General Electric Versatol* Geoprene* locomotive cables are designed to meet your toughest service conditions.

Registered Trade-mark General Electric Company

These cables are dependable in over-load conditions, too. When steep grades and heavy hauls cause copper temperatures to rise, the insulation of the Versatol Geoprene cable will carry the load without deteriorating.

G-E locomotive cables are available in a variety of types for all applications (even extreme temperature) right from conveniently located warehouse stocks. For more information, write Section W213-747, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

Progress Is Our Most Important Product

GENERAL ELECTRIC

IDEAL

SHORTCUTS to better commutator maintenance

QUALITY-BUILT TO DO THE JOB RIGHT! . . .

The easiest way to restore commutators in traction motors and generators without dismantling during interim maintenance...or during periodic overhauls. IDEAL Resurfacers and other tools are used by leading railroads and recommended by locomotive builders.

RESURFACERS

Refinish commutators to like new condition even when ridged, scored or burned. Wood block handles clamp rigidly into grinder. Seven sizes, in all grades from extra coarse to extra polish.

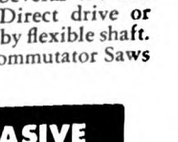
MICA UNDERCUTTERS

Work easily in close quarters. Several models. Direct drive or by flexible shaft. For use with IDEAL Commutator Saws and Milling Cutters.

FLEXIBLE ABRASIVE

Cleans and burnishes commutators. Non-dusting. Complete size range.

CLEANER-BLOWERS



Blows air at high velocity and harmless low pressure. Lightweight and rugged. May also be used as a vacuum cleaner or sprayer. Three models: ⅔, ⅔ and 1⅓ H.P.

FREE 39-page Handbook
Complete information on commutator maintenance.
Mail coupon.

IDEAL Products Are Sold through Leading Distributors

IDEAL INDUSTRIES, Inc.
1563-G Park Avenue, Sycamore, Illinois

Send FREE Handbook and catalog sheets on:

☐ Resurfacers ☐ Undercutters ☐ Flexible Abrasive ☐ Cleaner-Blowers

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

"BREAKING LUBRICATION BARRIERS". A 16-page bulletin No. 110, printed in four colors, provides a textbook on technical aspects of molybdenum disulfide as an extreme pressure lubricant. Physical and chemical properties are also covered, together with a catalog-type selection table, photographs showing variety of uses, and a section on solid film lubricating coatings. (Write: *Alpha Molykote Corporation,* Dept. RLC, 65 Harvard ave., Stamford, Conn.)

WELDWOOD ARMORPLY. Folder describes Weldwood Armorply, a panel usually with a plywood core and metal facings, for truck and trailer floors and doors, walk-in coolers and freezers, railroad car interiors, building fronts, etc. Describes also a series of simple beam bending and plate bending tests, and twisting shear and edgewise compression loads tests. (Write: *United States Plywood Corporation,* Dept. RLC, 55 West 44th St., New York 36.)

RYKON GREASES.—4-page bulletin No. 127 outlines eight advantages of a new multi-purpose industrial grease having a non-soap hydrocarbon thickener. Typical test data includes service applications and photographs of grease structure. (Write: *Standard Oil Company (Indiana),* Dept. RLC, Chicago 80).

BRASS VALVES. Four-page folder gives complete sizes and dimensions of brass composition-disc globe, angle, and lift check valves for steam, water, air, oil, gas, and gasoline lines. (Write: *Crane Company,* Dept. RLC, 836 S. Michigan ave., Chicago 5.)

"CARE OF DRILLS AND REAMERS." 22-page booklet gives technical data on use, sharpening and handling of drills and reamers of either high-speed or carbide steel. Illustrated with graphs and charts. (Write: *Chicago-Latrobe,* 411 West Ontario st., Chicago 10.)

LEADED ALLOY STEEL. 8-page engineering data bulletin No. 14-5, describes the advantages of Rycut 40, a chrome-moly .40 carbon steel alloy with controlled addition of lead. Case studies and mechanical properties also included. (Write: *Joseph T. Ryerson & Sons, Inc.,* Dept. RLC, Box 8000-A, Chicago 80.)

HELIWELD EQUIPMENT. — Catalog 2,300 illustrates complete line of equipment designed for use in applications of Air Reduction's tungsten arc Heliweld process. Discusses advantages of process and factors which determine equipment selection. Contains information on various types of manual, semiautomatic, and automatic equipment; on accessory devices, and on the selection of the electrode and filler wire most suitable for use in any specific Heliwelding operation. (Write: *Air Reduction Sales Company, a division of Air Reduction Company,* Dept. RLC, 150 East 42nd st., New York 17.)

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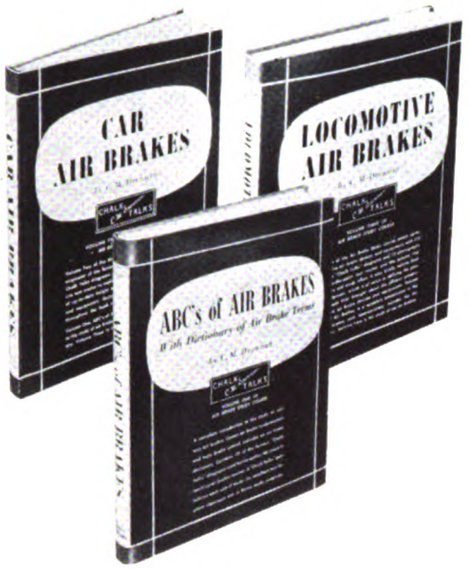

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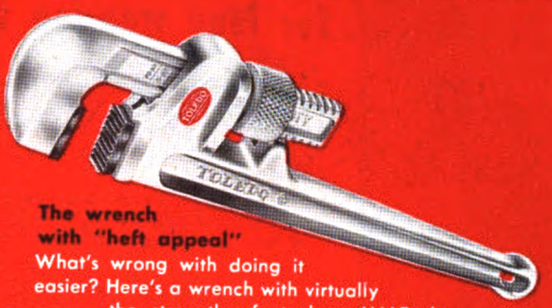

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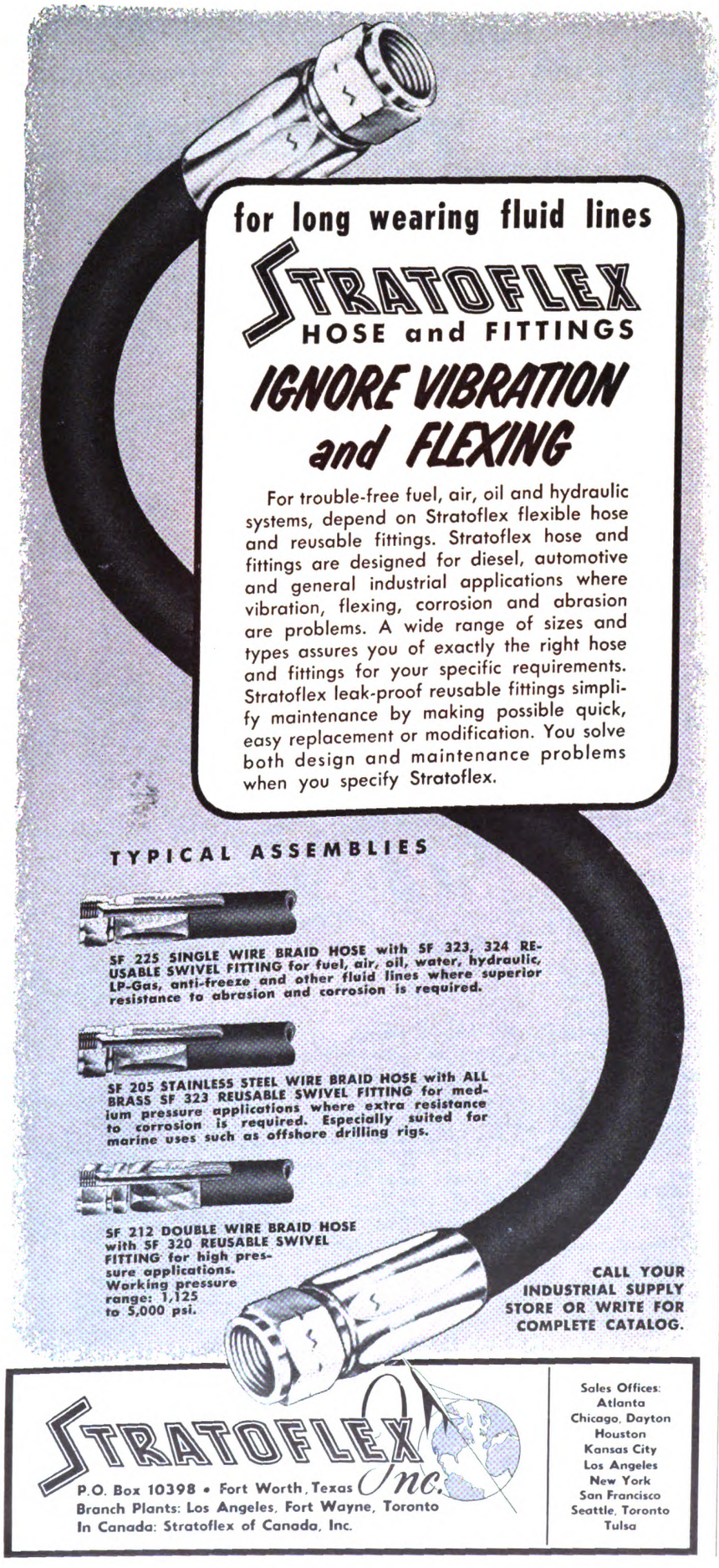

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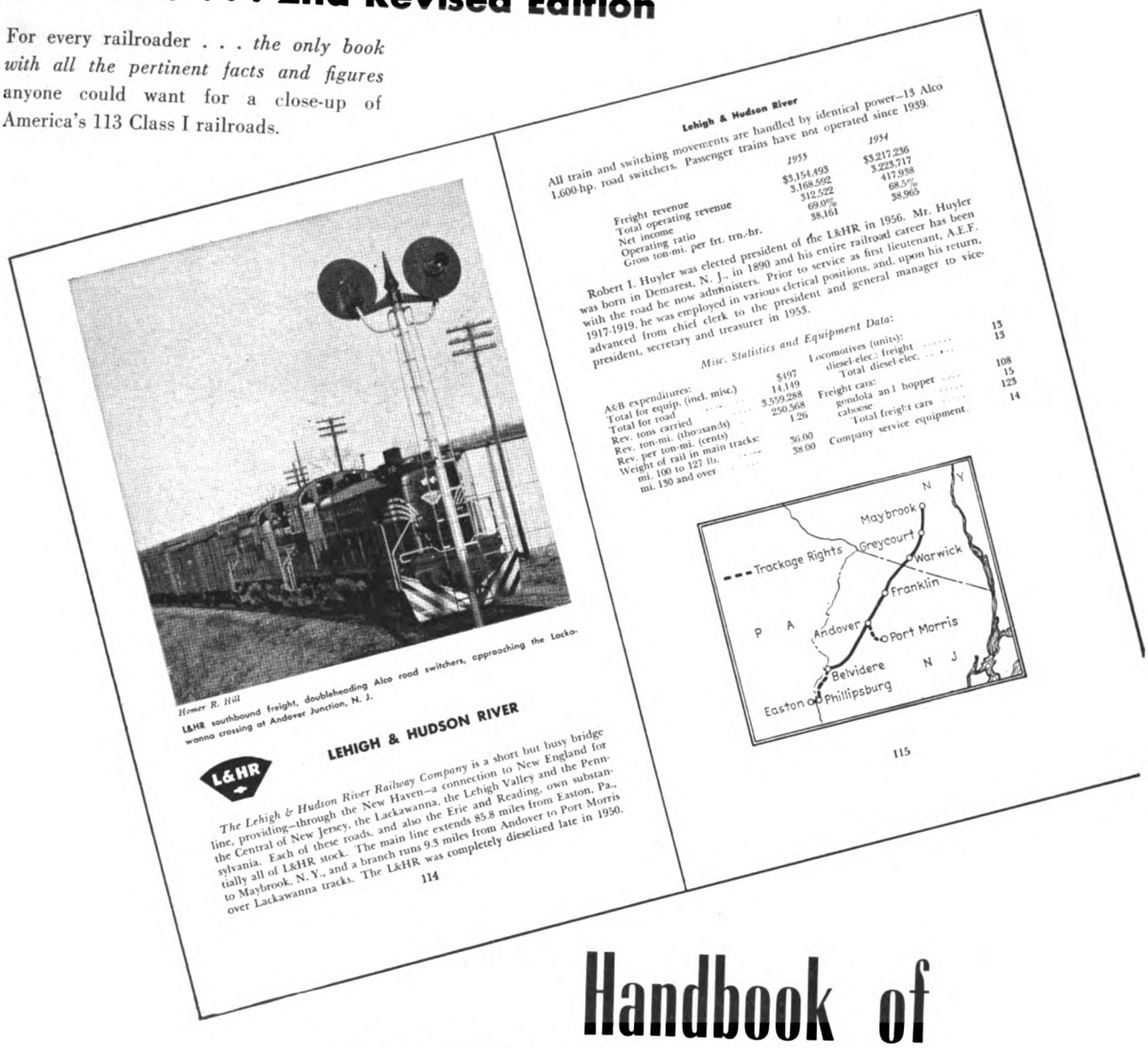

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L&HR southbound freight, doubleheading Alco road switchers, approaching the Lackawanna crossing at Andover Junction, N. J.

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Robert I. Huyler was elected president of the L&HR in 1956. Mr. Huyler was born in Demarest, N. J., in 1890 and his entire railroad career has been with the road he now administers. Prior to service as first lieutenant, A.E.F. 1917-1919, he was employed in various clerical positions, and, upon his return, advanced from chief clerk to the president and general manager to vice-president, secretary and treasurer in 1953.

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A&B expenditures:		Locomotives (units):	
Total for equip. (incl. misc.)	$497	diesel-elec.: freight	13
Total for road	14,149	Total diesel-elec.	13
Rev. tons carried	3,559,288		
Rev. ton-mi. (thousands)	250,568	Freight cars:	
Rev. per ton-mi. (cents)	1.26	gondola and hopper	108
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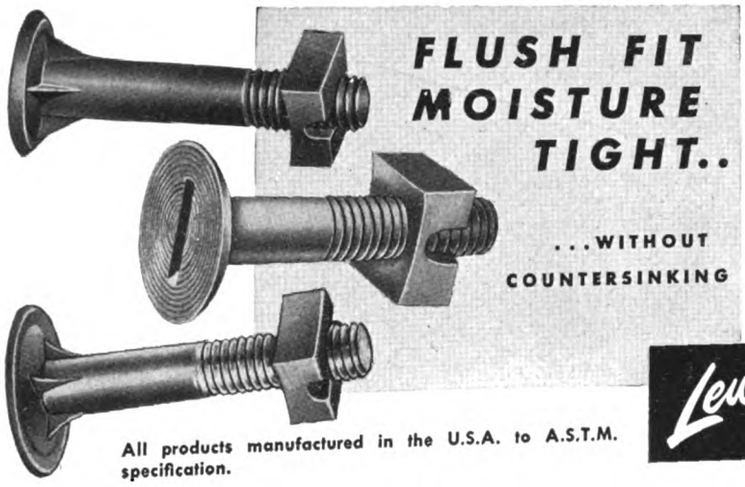

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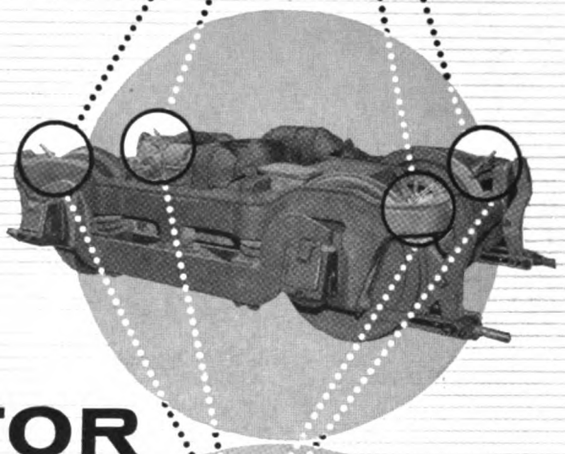

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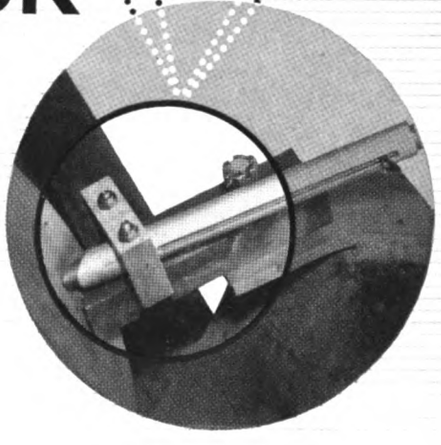

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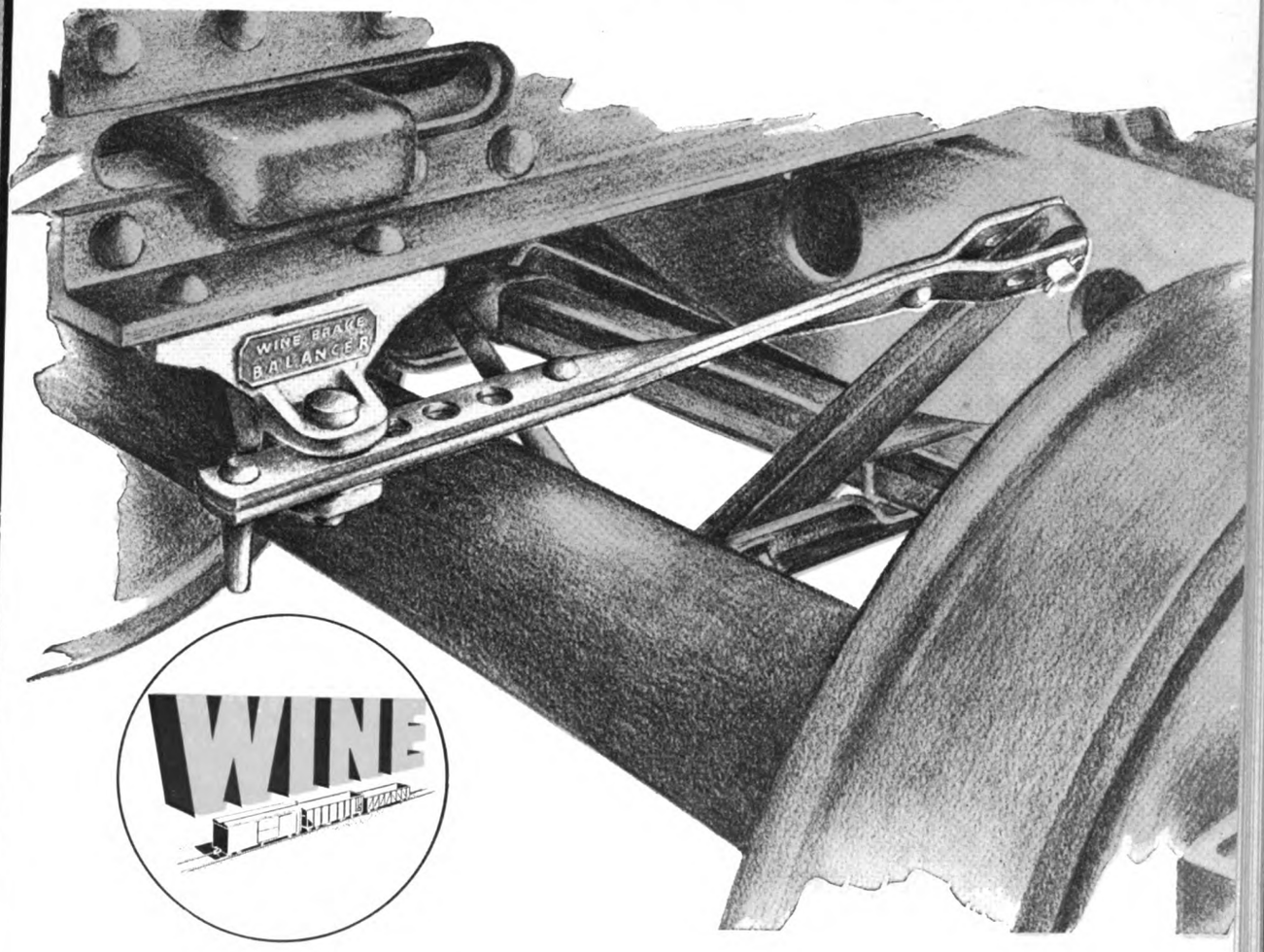

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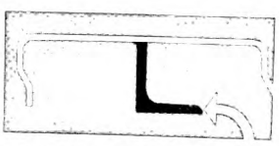

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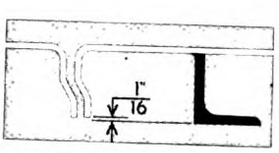

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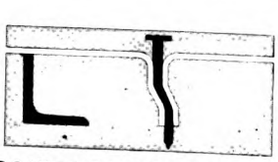

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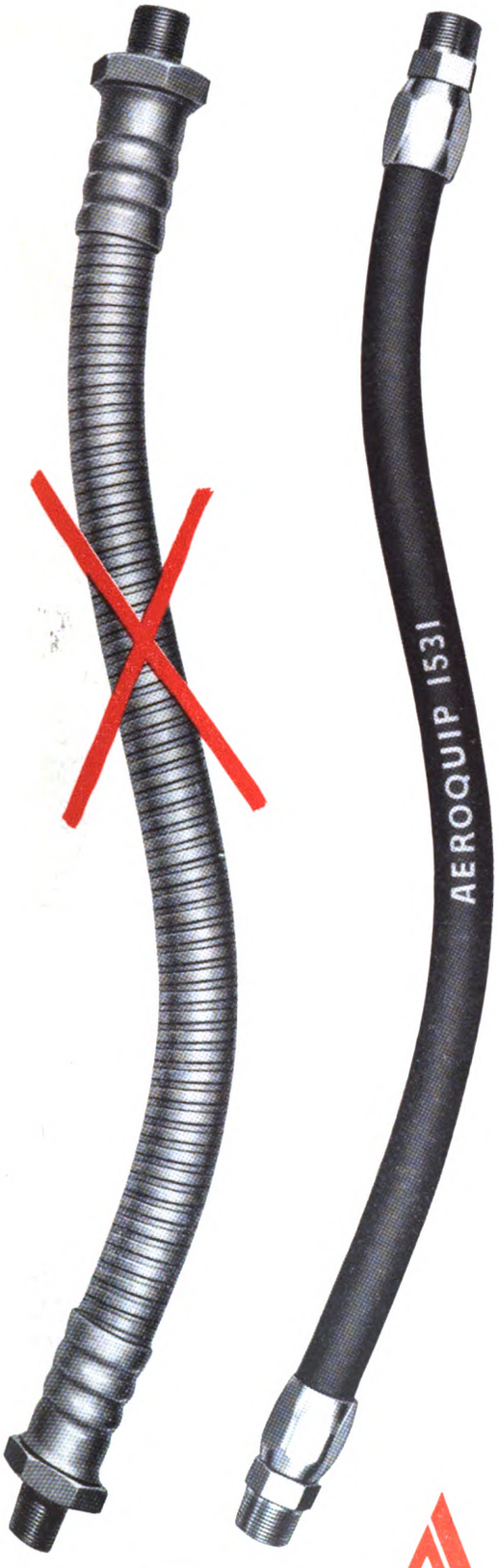

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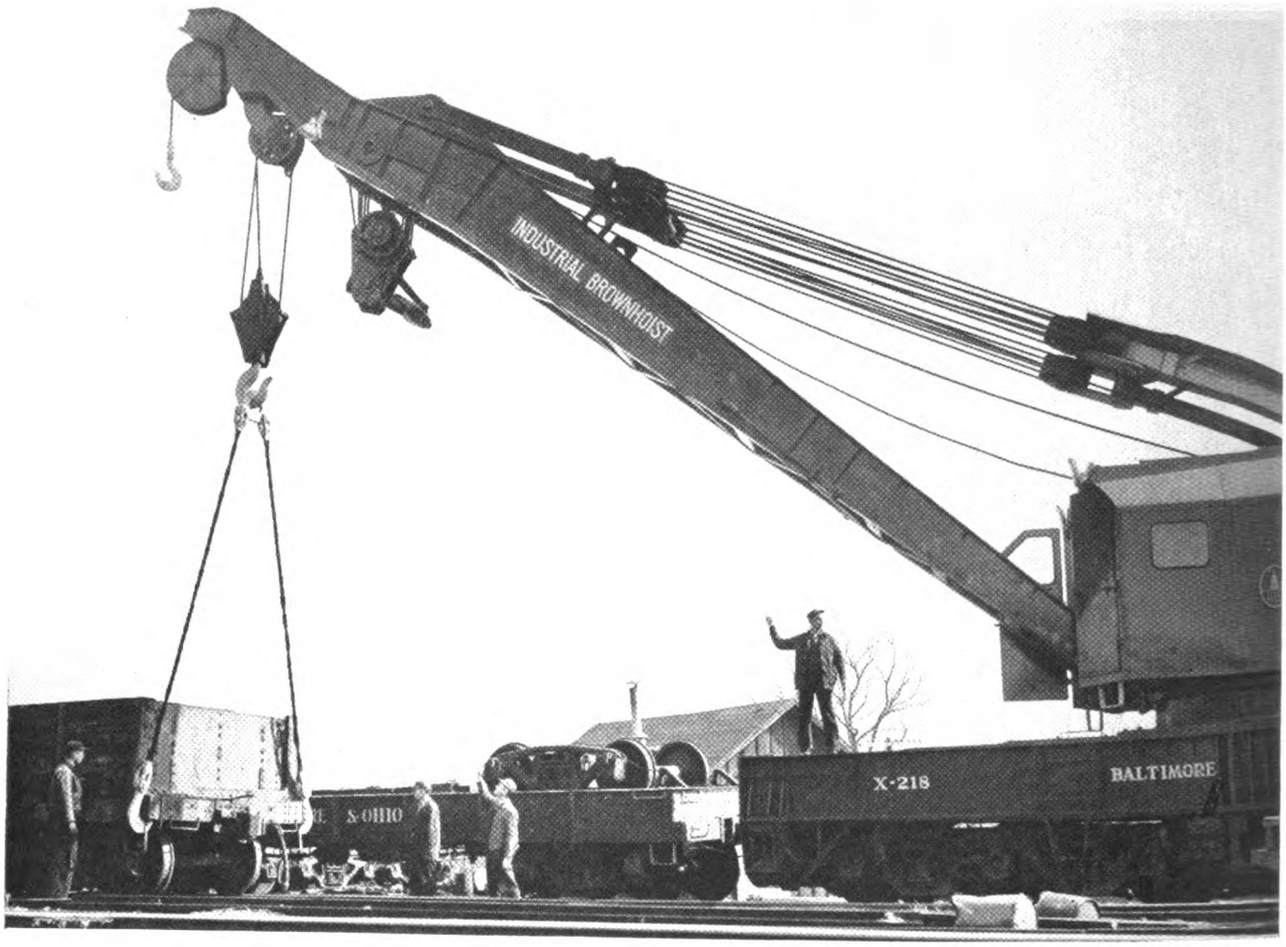

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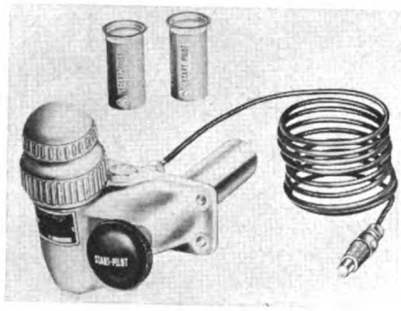
AB Color Schematics
Coal-Burning Gas Turbine Locomotive



Starting Capsules

The Start Pilot, a diesel engine starting device, and aluminum multi-start capsules are said to be used extensively in Europe, eliminating the practice of running some engines constantly at night or during cold periods to assist other engines in their start-up period.

The unit's double action air pump allows the operator to follow through on the engine until continuous firing has been achieved. On certain types of engines it has been found advisable to use two Start Pilots, mounted on opposite sides of the cylinder block. *Start Pilot Corporation, Dept. RLC, Mineola, N. Y.*

Pneumatic Outlet

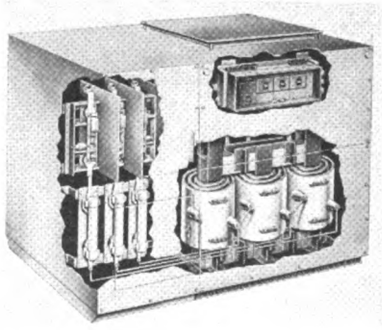
This valve, designed for covered hopper cars, in combination with the manufacturer's cast-steel frame and gate, is said to offer a new concept in unloading as there are two systems of unloading at the operator's disposal. The standard outlet permits the conventional gravity-flow bottom discharge system to be used, while the pneumatic valve allows the car to be unloaded by pneumatic conveyors. Either system requires only one man.

The valve was developed for sanitation and for easy unloading of dry, granular, or powdered commodities. According to the manufacturer, it can be applied to any existing covered hopper car provided it is equipped with proper discharge gates.. *Enterprise Railway Equipment Company, Dept RLC, 59 East Van Buren st., Chicago 5.*

Steam Cleaning Liquid Detergents

Oakite LSD, a liquid detergent, has been designed for use in solution-lifting steam guns and self-generating steam cleaning equipment. It simplifies the preparation of steam cleaning solution, reduces the clogging of coils in self generating equipment, and will handle a wide variety of cleaning operations ranging from light to medium-heavy duty.

The detergent is said to provide effective soil removal at concentrations of 1 to 2 oz to each gallon of water as delivered by the gun. Used as recommended, it is said to be safe on steel, brass and magnesium, and to have no effect on painted surfaces. In the operating range, its solution has a pH of 12 and users report no offensive fumes. *Oakite Products, Inc., Dept. RLC, 146 Rector st., New York 6.*



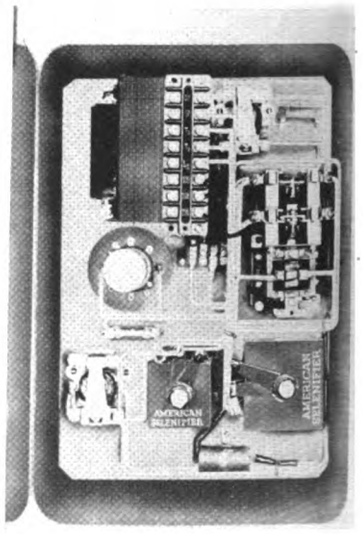
One-Piece Electrical Load Centers

Illustrated is a cut-away view of a new single-unit integral electrical distribution center, requiring about 42 per cent less space than conventional distribution centers.

The center combines in one piece all three sections necessary for load center applications: incoming line, transformer, and outgoing feeder.

Designed to pass through normal-size shop doors in an upright position, the unit's installed height is 80 in. It is 10 in. lower than conventional centers. For moving purposes, the new unit is 78 in. high, because the 2-in. high shield over the air vent on top of the center is easily removed. It can be shipped, rolled and installed in one piece. It is 37½ to 42½ in. deep, and 56 to 106 in. wide.

A complete line of integral distribution centers is available in standard ratings of 75-, 112.5-, 150-, and 225-kva. Standard voltage ratings from 208 volts to 15,000 volts are available. *General Electric Company, Dept. RLC, Schenectady, N. Y.*



All-Electric Motor Brake

An all-electric brake for use on any a-c motor from ¼ hp to 250 hp, and up, is now being introduced. Known as a Selenibrake, it is said to provide a surer stop than a mechanical brake. Unlike a mechanical brake, the Selenibrake can repeat its stopping cycle indefinitely without variation in braking torque.

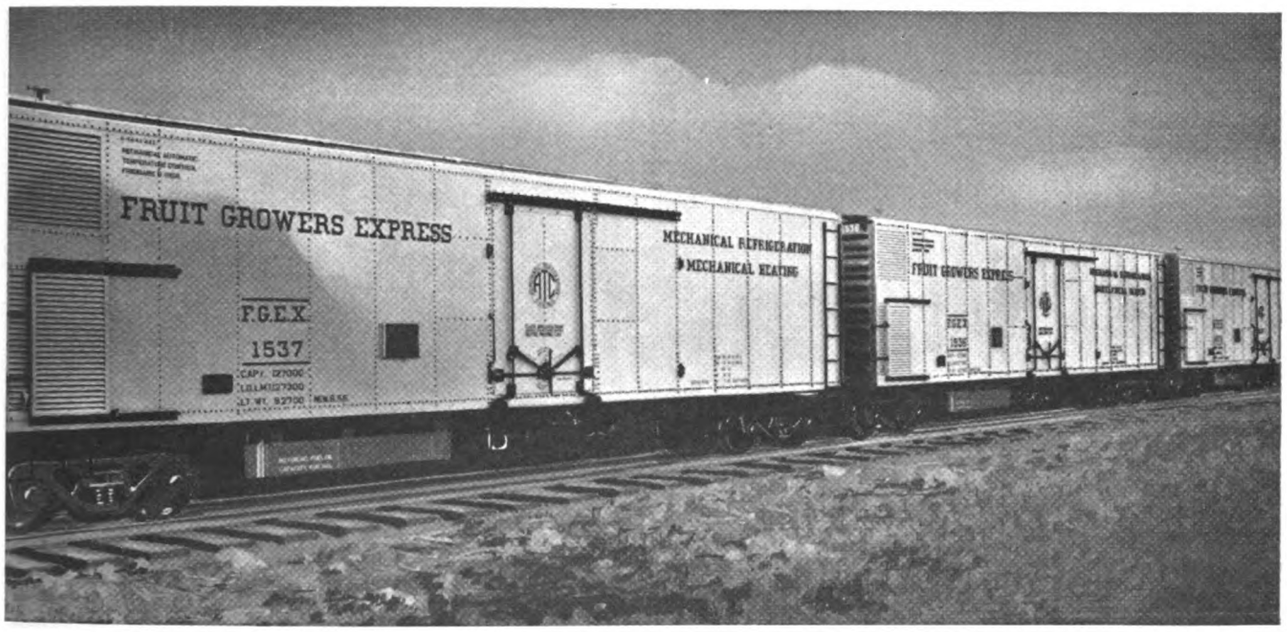
It can be supplied for any voltages up to 600 volts either 60, 50 or 25 cycles. No connection of any kind is made to the motor itself. It is applied to the standard starter of the motor by means of six connections. Since it is installed away from the motor, cramped motor space presents no problem.

The unit employs a principle of operation which offers advantages over conventional mechanical brakes as well as ordinary electrical brakes using the same system of operation. Braking torque may be adjusted over a wide range, and it can be applied to any motor starter at any time. It is claimed to be safer than plugging and can be applied to a single- or three-phase motor with slight modification in its internal connection.

The brake is housed in standard metal

(*Continued on page 66*)

80,000,000 CAR MILES WITHOUT A SINGLE HOTBOX



1,527 FRUIT GROWERS EXPRESS AND ASSOCIATED COMPANIES CARS SET RECORD ON HYATT HY-ROLLS

4 Key Reasons Why Hy-Rolls Are So Dependable, Economical

The Hy-Roll design is the culmination of HYATT'S experience in building more time-tested straight cylindrical roller bearings than any other maker. It has four key features:

1. Straight cylindrical rollers provide greater load carrying capacity and longer life.
2. Fewer parts simplify maintenance.
3. Generous race flanges absorb lateral thrusts.
4. Positive seals retain 3-year grease supply, prevent damage from foreign matter.

As of June 1, 1957, 1,527 FGE-WFE-BRE cars equipped with HYATT Hy-Roll Bearings have established an enviable performance record: over *eighty million* car miles without a single hotbox. 102 of these reefers have been in continuous service since May, 1953; the remainder joined the combined FGE-WFE-BRE fleet during 1953-1957.

1,000 New Cars Hyatt-Equipped

When FGE-WFE-BRE officials recently decided to equip their latest 1,000 cars with roller bearings, they again selected HYATT Hy-Rolls. Their decision was based on the millions of hotbox-free miles already accumulated on their Hy-Roll-equipped cars, and the ever-growing demand for *on time* delivery of high-value lading.

HYATT Hy-Roll Bearings for freight cars are *proved by performance.* Why not let us prove their value for you on your equipment? Call or write Hyatt Bearings Division, General Motors Corp., Harrison, N. J.

Another GM GENERAL MOTORS contribution to railroad progress

HYATT Hy-ROLL BEARINGS
FOR NON-STOP FREIGHT

New Shop Facilities

The *Illinois Terminal* is extending its diesel shop facilities at Federal, a suburb of Alton, Ill., at a cost of about $200,000. The project is scheduled for completion about December 1.

The *McCloud River* has completed construction of a combination diesel-car repair shop at a cost of approximately $155,000. The building, 120 ft by 18 ft, is equipped with a 10-ton traveling overhead crane.

Atlantic City Meetings Planned

Plans are being discussed for simultaneous meetings of the AAR Mechanical Division; the Electrical Section, Mechanical and Engineering Divisions; and the Purchases and Stores Division, AAR, at Atlantic City in June 1959. Coincident with the meetings would be exhibits of mechanical and other products under the sponsorship of the Railway Supply Manufacturers' Association. The plans are still in the making and no definite dates have been established.

Southern PS-1 Box Cars Have Steel Lining—Correction

In the article, "Southern PS-1 Box Cars Have Steel Lining," which appears on pages 46 and 47 of the June issue of Railway Locomotives and Cars, the sentence on page 47, third line from top, states the cars are equipped with P-S nailable steel floor. This should read the cars are equipped with Stran NSF Steel flooring. 1,200 PS-1 box cars built in 1955 for the Southern were so equipped with 200 scheduled for 1957.

Plans for an 'Airail' Car

Plans for an 'airail' car that would be gasoline-powered, driven by a propeller in the rear and stabilized by fins, have been announced by an aircraft company. The car would hang beneath a "safety rail" and could be operated in either single or multiple units.

Miscellaneous Publications

AAR REFRIGERATOR CAR FAN SYSTEM REPORT.—Mechanical Research Report MR-230—Laboratory Performance Tests on Two Types of Electric Fan Systems for Refrigerator special plenum chamber, constructed at the laboratory, of a size duplicating one-half of a standard 40-ft refrigerator car. Cars, dated May 1957, contains test data obtained through the use of a *Fred Peronto, secretary, Mechanical division, Association of American Railroads, 59 East Van Buren st, Chicago 5, copies to members, $2.00 each, to other than members, $4.00 each.*

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
April, 1953	2,850,753	3,383	6,435	9,818	290,359
April, 1954	2,570,519	3,079	5,149	8,228	312,411
1955					
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425
1957					
January	2,767,060	3,373	6,121	9,494	291,453
February	2,675,265	3,272	6,844	10,113	264,538
March	3,027,280	3,164	6,687	9,851	307,306
April	2,832,406	3,949	8,447	12,396	228,493

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE JULY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and builder	*No. of units*	*Horsepower*	*Service*	*Other detail*
CHICAGO, BURLINGTON & QUINCY:				
Electro-Motive	30	1,750	Road switch	SD-9's. For delivery August-September-October.
ST.-LOUIS-SOUTHWESTERN:				
Electro-Motive	6	1,750	General purpose	Cost, $1,140,000. For October delivery.

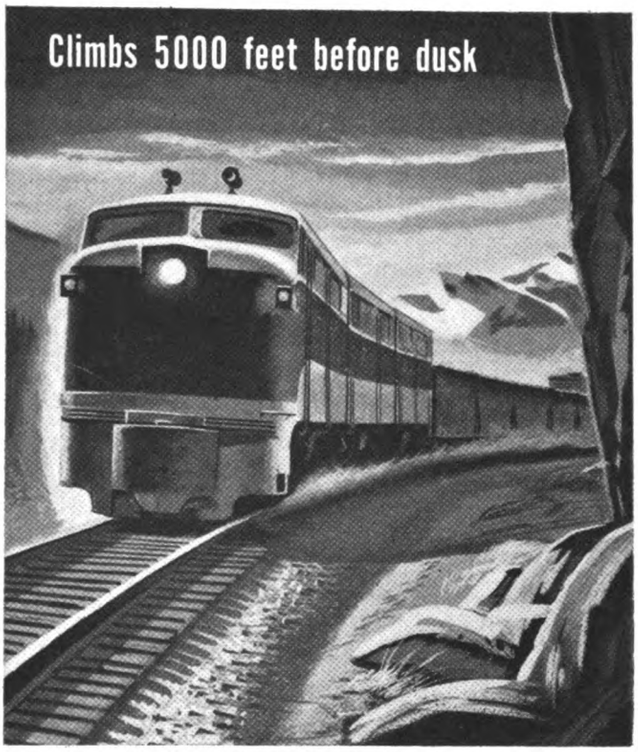
FREIGHT-CAR ORDERS

Road and builder	*No. of Cars*	*Type of car*	*Cap., tons*	*Other detail*
BALTIMORE & OHIO:				
Company shops	225	Gondola	70	Completion expected this month.
GREAT NORTHERN:				
Company shops	1,000	Box	50	Cost, $8,800,000. For completion by September 1958.
	50	Flat	50	Cost, $600,000. For completion by May 30, 1958.
KAISER ALUMINUM & CHEMICAL CORPORATION:				
Pullman-Standard	24	Gondola	—	With all-welded aluminum bodies, supplementing present fleet of 35 such cars hauling bauxite in Jamaica, BWI. Delivery to begin in October.
PITTSBURGH & LAKE ERIE:				
Despatch Shops	2,000	Hopper	—	Unit cost, $8,300.
Greenville Steel Car	500	Mill type gondola	—	Unit cost, $10,500.
SACRAMENTO NORTHERN:				
ACF Industries	20	Drop bottom gondola	70	For delivery first quarter 1958.

PASSENGER-CAR ORDERS

Road and builder	*No. of Cars*	*Type of car*	*Other detail*
CANADIAN PACIFIC:			
Budd Co.	1	RDC-1	Delivered.
UNION PACIFIC-WABASH:			
Pullman Standard	6	Astradome coaches	Five for UP; 1 for Wabash for "City of St. Louis." Delivery to start second quarter 1958.

This job isn't as tough as it looks...



NATIONAL BRUSHES *assure*

TRADE-MARK

balanced performance *under all operating conditions!*

Long brush life, excellent commutator condition — "National" brushes assure both on all types of equipment, in all classes of service. Reason for such remarkably *balanced performance:* NATIONAL CARBON'S long-term brush development *specifically for railroads.*

Millions of test-miles prove out each "National" brush grade. And there's a fully tested brush for every diesel-electric traction motor and generator requirement. Ask your "National" brush man to show you why his brushes outsell all others combined.

BALANCED PERFORMANCE ASSURES:

LONG BRUSH LIFE — stands up under constant shock and long, hard runs.

EXCELLENT COMMUTATOR CONDITION — superior film-forming qualities preserve commutators and assure smooth, quiet running.

NATIONAL BRUSHES

TRADE-MARK

Best for all types of equipment . . . preferred for all types of service

UNION CARBIDE

The terms "National", "Union Carbide" and the Silver Colored Cable Strand are registered trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY • Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N.Y.

Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

COORDINATED MECHANICAL ASSOCIATIONS MEETINGS

September 16, 17 and 18, 1957

(The programs for the Coordinated Mechanical Associations as they appear below are in brief. More detailed programs will appear in the September issue, also a list of the Allied Railway Supply Association exhibitors.)

MONDAY, SEPTEMBER 16

Air Brake

Address: Pres. R. J. Dewsbury.

Address: Wm. M. Keller.

Composition Brake Shoes—Montreal Air Brake Club.

Pressure Maintaining.

Satisfactory Safety Valves.

Joint meeting with RF&OOA—24-RL Brake Equipment.

Car Department Officers

Address: Pres. H. M. Nelson.

Report: Construction, Maintenance and Upgrading Freight-Car Equipment.

Address: Speaker to be named.

Report: AAR Loading Rules.

Report: Interchange and Billing for Car Repairs.

Report: Wheel Shop Practices.

Locomotive Maintenance Officers

Special address: R. M. MacDonald, director of operations, Board of Transport Commissioners for Canada. Subject: A Cooperative Approach to Safety.

Report: Diesel Mechanical—other than engine.

Report: General diesel maintenance subjects.

Report: Diesel Electrical.

Railway Fuel and Operating Officers

Address: Pres. T. J. Conway.

Address: Speaker to be named.

Operating Responsibility to Avoid Delay to Traffic.

Safety.

Abuse of the Diesel Locomotive.

Joint meeting with ABA—24-RL Brake Equipment.

TUESDAY, SEPTEMBER 17

Basic Characteristics of Air Brake Equipment Affecting Train Operation—St. Louis Air Brake Club.

Address: J. A. Welsch, general superintendent motive power, IC. Subject: Changes I Have Noticed in Air Brakes.

Planning Through Research—C. F. Hammer, Westinghouse Air Brake Co.

Some Facts on Charging Times.

Report: Light Repair Tracks and Train Yard Operation.

Address: Speaker to be named.

Report: Car Lubrication.

Comments by Wm. M. Keller.

Special address: H. R. Longhurst, assistant director, Bureau of Safety and Service, ICC. Subject: Railroad Safety.

Report: Shop Equipment. Topic: Machinery and Equipment for Cleaning, Testing and Overhauling Diesel Locomotive Components.

Dual Fuel Control.

Public Relations.

Panel discussion—Proper Method of Teaching Train Rules to Operating Personnel.

Impending Legislation Affecting the Railroads.

WEDNESDAY, SEPTEMBER 18

Elections.

Testing of Diesel-Electric Locomotive Air Brake Equipment—Pittsburgh Air Brake Club.

Question Box.

Committee reports.

Report: Air Conditioning Equipment — Operation and Maintenance.

Report: Maintenance of Passenger-Car Equipment.

Report: Painting — Modern Methods in Finishing Railroad Equipment.

Report: Maintenance and Servicing of Mechanically Equipped Refrigerator Cars.

Miscellaneous reports.

Election of officers.

Report: Diesel Engine Maintenance. Topic: Chrome Plated Liners and Crankshafts and Lube Oil Cooling and Filtering Systems.

Report: Diesel Material Reconditioning and Control. Topic: Determination of Diesel Locomotive Material Items Economical to Reclaim.

Report—Boiler Makers' Section. Topic: Economical Methods of Cleaning Steam Generators and Appurtenances.

Report: Diesel Fuel and Lube Oil. Topic: Economy Fuel—Its Effect on Diesel Locomotive Maintenance.

Panel discussion—Diesel Troubles; Cause and Remedies.

Utilization of Power.

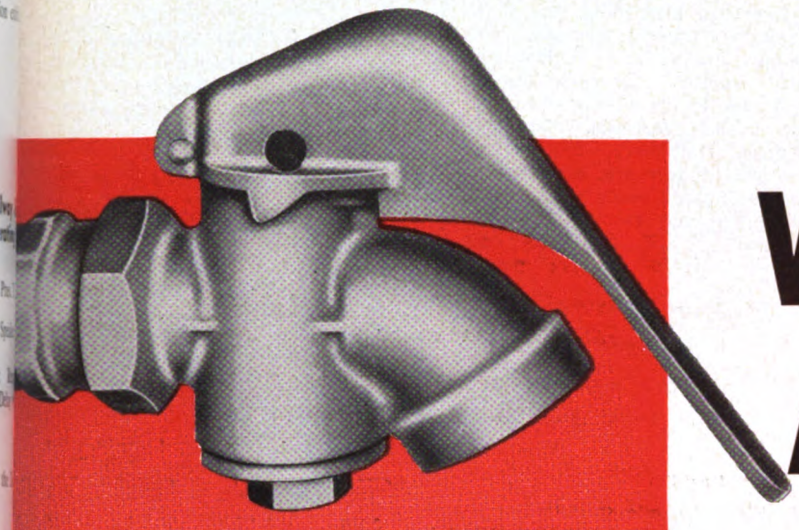
Improved Methods of Educating Engine Crews.

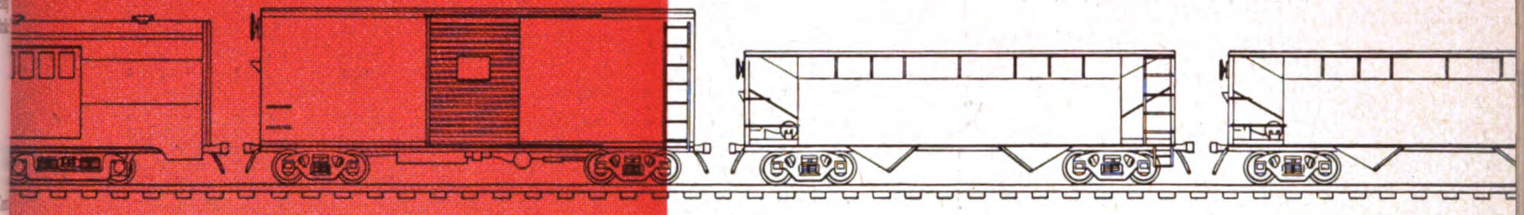
Effect of Motive-Power Modernization Upon Duties of Road Foremen.

Treating of Rails Chemically to Avoid Slipping, Use of Sand, etc.

Economical Fuel Handling.

Stop those air leaks with new WABCOSEAL® Angle Cocks

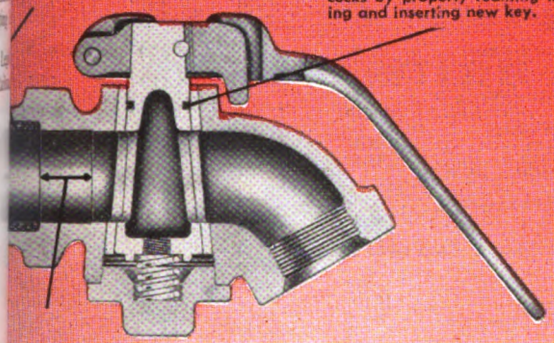




FOR FREIGHT CARS:

abco compression ring grips pipe
en nut is tightened to provide
ht seal and strong clamping action.

"O" ring seals the key effectively through a wide degree of key wear. This seal can be used on old angle cocks by properly reaming the bushing and inserting new key.



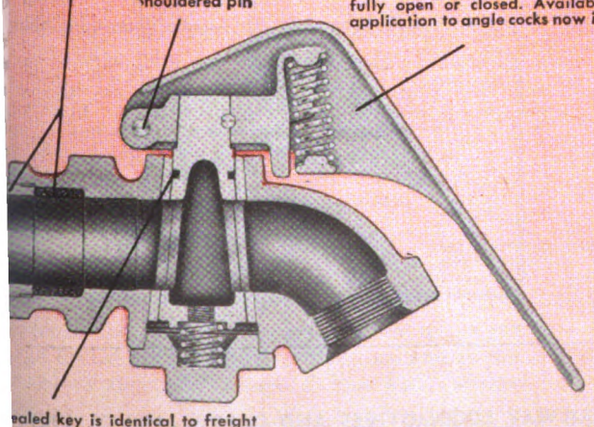
rake pipe nipple length can fall anywhere within this
nge and still be perfectly sealed. Threaded nipple is not
ecessary but can be used if more convenient.

FOR PASSENGER CARS AND LOCOMOTIVES:

lew Wabcoseal fitting is same as
or freight car angle cock shown
bove.

houldered pin

Strong spring is compressed when handle is raised. Socket is snapped into locking position when handle is fully open or closed. Available for application to angle cocks now in use.



ealed key is identical to freight
r angle cock key shown above.

DON'T tolerate a high air leakage rate on your trains. Use the new Wabcoseal Angle Cocks for tighter seals.

The sealed key is new, with an "O" ring seal that stays tight through a wide range of key wear.

The brake pipe connection is new. A rugged Wabco compression ring replaces the old tapped thread. Tolerance for length of pipe nipple is now provided.

The spring-locking handle is new for passenger cars and locomotives. When the handle is removed to fully open or closed position a strong spring snaps the socket into locked position and keeps it there. A shouldered pin provides proper freedom of handle movement.

The sealed key and spring-locking handle are available for application to present angle cocks. See your Westinghouse Air Brake representative for more information.

Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION WILMERDING, PA.

Personal Mention . . . .

Atchinson, Topeka & Santa Fe.—CHARLES MONTGOMERY, JR. general passenger car inspector at Chicago, appointed color and design engineer.

Baltimore & Ohio.—J. A. F. CRAIG appointed master mechanic at Punxsutawney, Pa., formerly master mechanic, B&O Chicago Terminal, Chicago. *John L. North,* supervisor of personnel training, appointed regional master car builder, succeeding H. W. Chew, retired. Headquarters, Baltimore.

Baltimore & Ohio Terminal.—C. J. HOWDYSHELL, general foreman, Chicago, appointed master mechanic.

Bessemer & Lake Erie.—ROY C. BEAVER, vice-president and general manager, retired. Formerly superintendent of motive power from 1945 until 1953.

Canadian National.—GEORGE M. DUFFY, locomotive tester, Moncton, N. B., shops, appointed air-brake and mechanical instructor, Atlantic Region.

Canadian Pacific.—*L. B. George,* assistant chief of motive power and rolling stock, system, Montreal, appointed chief of motive power and rolling stock, succeeding *F. A. Benger,* retired. *W. D. Dickie,* works manager, Angus shops, Montreal, succeeds Mr. George. *C. W. Parker,* special engineer, motive power department, appointed chief mechanical engineer. *H. W. Hayward,* engineer of standards and methods, office of motive power and rolling stock, succeeds Mr. Dickie.

Central of Georgia.—*C. H. Carroll,* general diesel supervisor, appointed supervisor diesel locomotive maintenance at Macon, Ga. *W. H. Leavengood,* mechanical engineer, appointed assistant master mechanic-system, with headquarters at Macon. *W. B. Grimes,* electrical engineer, appointed equipment engineer at Savannah, Ga.

Chesapeake & Ohio.—J. J. LOCKWOOD appointed train master and road foreman of engines, Huntington, W. Va., succeeding H. E. BESS, retired.

Chicago & North Western.—H. K. COX appointed master mechanic, Twin Cities Division. Headquarters, St. Paul, Minn.

Great Northern.—DONALD F. MARSTON appointed mechanical assistant at St. Paul. JOSEPH F. N. GAYNOR appointed assistant master mechanic at Wenatchee, Wash.

New York Central.—PAUL N. BOWER, appointed general foreman at East Rochester, N. Y., car shops. R. L. WOEMPNER, shop draftsman, appointed equipment engineer at Beech Grove, Ind., car shop. GORDON M. BROWN, draftsman, appointed assistant equipment engineer at East Rochester car shops. W. R. SCHULTZ, assistant apprentice instructor, appointed apprentice instructor at Collinwood, Ohio, diesel locomotive shop.

Pennsylvania.—W. F. COUNTY and J. B. FULTON appointed assistant foreman, Paoli, Pa. J. W. IRWIN appointed motive-power inspector, Harrisburg, Pa. E. L. PRICE appointed assistant foreman, Enola enginehouse, Enola, Pa. J. F. ROSEMAN appointed assistant foreman, Juniata shop, Altoona, Pa. N. F. THOMPSON appointed assistant foreman, Harrisburg diesel shop, Harrisburg, Pa. D. W. GRIMM, assistant foreman, methods and cost control, Juniata heavy repair shops, appointed assistant master mechanic, East Altoona, Pa. E. T. HARLEY appointed foreman of motive power, Louisville, Ky., and Jeffersonville, Ind. W. J. ADAMS appointed foreman, enginehouse, Terre Haute, Ind.

Quebec North Shore & Labrador.—*J. J. Miller* appointed chief mechanical officer at Sept-Iles, Que., succeeding *J. H. Miller,* resigned. J. J. Miller formerly regional supervisor of diesel equipment, Atlantic Region, Canadian National.

Richmond, Fredericksburg & Potomac.—HARTWELL T. RAINEY, JR., superin-

(*Continued on page 79*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of April		4 months ended with April	
		1957	1956	1957	1956
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	2,148	3,751	9,274	16,660
3—06	Total, Diesel-electric	36,556	36,870	145,821	147,912
3—07	Total, electric	685	733	2,823	2,897
3—04	Total, locomotive-miles	39,622	41,587	158,892	168,367
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1.584	1,677	6,381	6,715
4—06	Empty, total	974	922	3,763	3,700
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	6,543	9,832	26,150	41,156
6—02	Total in oil-burning steam locomotive trains	114	645	698	3,974
6—03	Total in Diesel-electric locomotive trains	107,417	106,939	425,907	422,873
6—04	Total in electric locomotive trains	2,139	2,292	8,682	8,756
6—06	Total in all trains	117,087	120,588	464,989	479,964
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	42.7	43.3	42.8	42.8
10—03	Empty freight car-miles	26.2	23.8	25.3	23.6
10—04	Total freight car-miles (excluding caboose)	68.9	67.1	68.1	66.4
10—05	Gross ton-miles (excluding locomotive and tender)	3,152	3,112	3,123	3,062
10—06	Net ton-miles	1,426	1,430	1,417	1,401
12	Net ton-miles per loaded car-mile (M-211)	33.4	33.0	33.1	32.7
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	61.9	64.5	62.9	64.3
14	Averages per train hours (M-211):				
14—01	Train miles	19.0	18.8	18.9	18.7
14—02	Gross ton-miles (excluding locomotive and tender)	59,239	57,731	58,489	56,706
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	46.3	47.1	45.8	46.8
17—02	All	44.5	45.3	44.1	45.0
18	Average net ton-miles per freight car-day (M-240)	921	966	916	948
20	Per cent of home cars of total freight cars on the line (M-240)	45.2	41.4	43.9	41.7

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—05	Steam	277	741	1,302	3,361
3—06	Diesel-electric	19,291	20,113	77,436	81,057
3—07	Electric	1,194	1,286	4,787	5,165
3—04	Total	20,762	22,140	83,525	89,583
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	212,160	227,253	851,681	918,331
4—09	Total in coal-burning steam locomotive trains	2,097	4,666	9,810	20,308
4—10	Total in oil-burning steam locomotive trains	19	991	259	7,002
4—11	Total in Diesel-electric locomotive trains	195,445	206,151	783,459	829,381
12	Total car-miles per train-mile	9.71	9.84	9.70	9.83

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	156,068	243,603	655,420	997,528
1—02	Steam, oil-burning	3,882	29,347	22,627	110,980
1—03	Diesel-electric[1]	3,777,539	3,781,916	15,143,458	15,375,781
1—06	Total	3,940,220	4,058,395	15,833,045	16,497,119
2	Passenger yard switching hours				
2—01	Steam, coal-burning	3,895	5,430	16,706	26,573
2—02	Steam, oil-burning	78	3,130	997	11,861
2—03	Diesel-electric[1]	238,770	245,242	971,788	989,694
2—06	Total	266,956	278,813	1,086,907	1,131,275
3	Hours per yard locomotive-day:				
3—01	Steam	5.5	6.0	5.7	6.0
3—02	Diesel-electric	15.4	16.0	15.5	16.0
3—05	Serviceable	15.6	15.8	15.7	16.0
3—06	All locomotives (serviceable, unserviceable and stored)	14.4	14.4	14.5	14.4
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.72	1.67	1.71	1.70
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.77	.76	.79	.76

[1]Excludes B and trailing A units

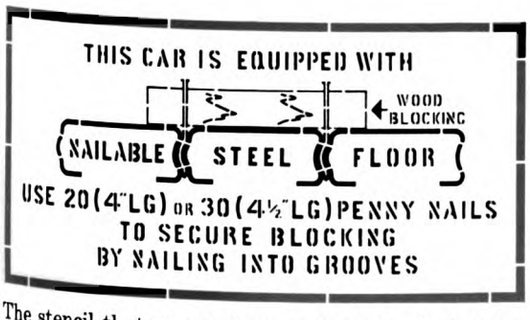
N-S-F® helps RAILROADS BUILD "PREVENTION PACKAGES" THE RIGHT WAY... FROM THE FLOOR UP!

"Prevention Package" . . . a freight car built with special features and maintained with special care to help put the brakes on the railroads' skyrocketing Cause F (defective or unfit equipment) loss and damage claims, now edging the $5 million annual mark.

The logical place to begin construction of a "Prevention Package" is right down on the floor, with NAILABLE STEEL FLOORING. Here's why:

- N-S-F will give the car greater structural strength from the underframe up.
- N-S-F substantially reduces floor damage and repairs by standing up to the concentrated loads of lift-truck operations.
- N-S-F takes repeated nailing of blocked loads without deterioration or leaking. Nails are driven *into* nailing grooves, not *through* the floor.

Full information about N-S-F and why it is the backbone of the "Prevention Package" is readily available from Stran-Steel representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Montreal.



The stencil that smart shippers look for in freight cars. It means better lading protection, and it can help reduce railroads' Cause F loss and damage claims.

N-S-F is a registered trademark of Stran-Steel Corp.

N-S-F®: NAILABLE STEEL FLOORING
Originated and sold by—
STRAN-STEEL CORPORATION
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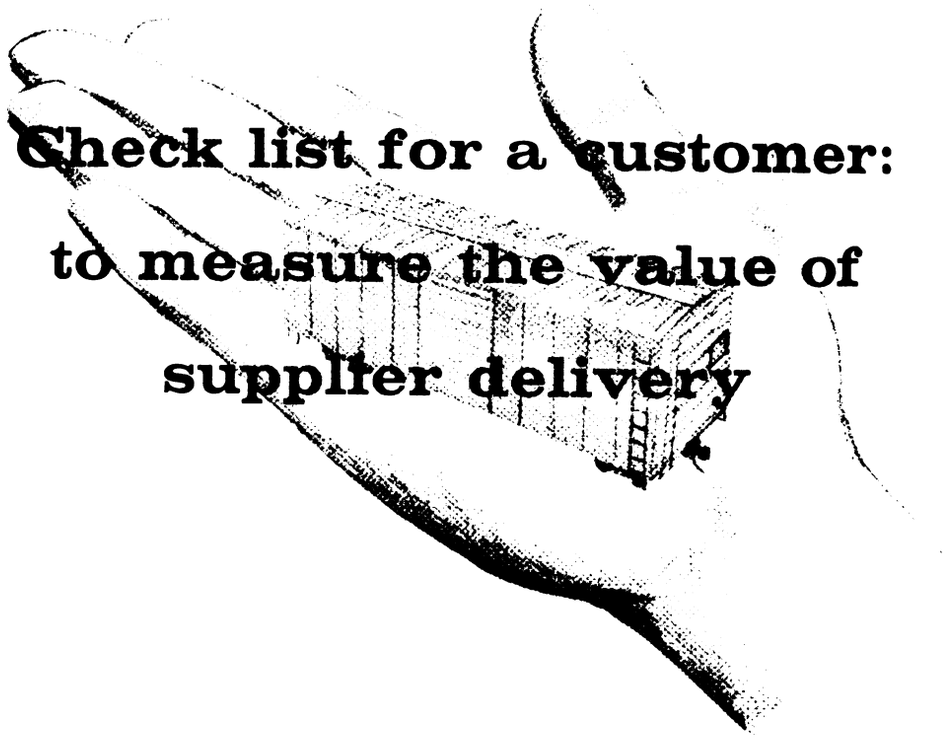


Check list for a customer: to measure the value of supplier delivery

Do you remember the Summer of 1956?

We do too!

Last summer we handled steel so hot it actually scorched timbers in the car. It came into our plant as red hot steel and left as Steel Ends . . . delivered on time. On one occasion, we received steel and shipped finished Ends, made from that *same* steel, in the *same railroad car* . . . delivered on time.

The Summer of 1956 is a good index to the value of a supplier's responsibility of "delivery". A responsibility that includes the same attention to parts and small orders as that given to large orders. A responsibility for on-time delivery at all times.

How important is delivery?

Your experience tells you a supplier has no greater responsibility.

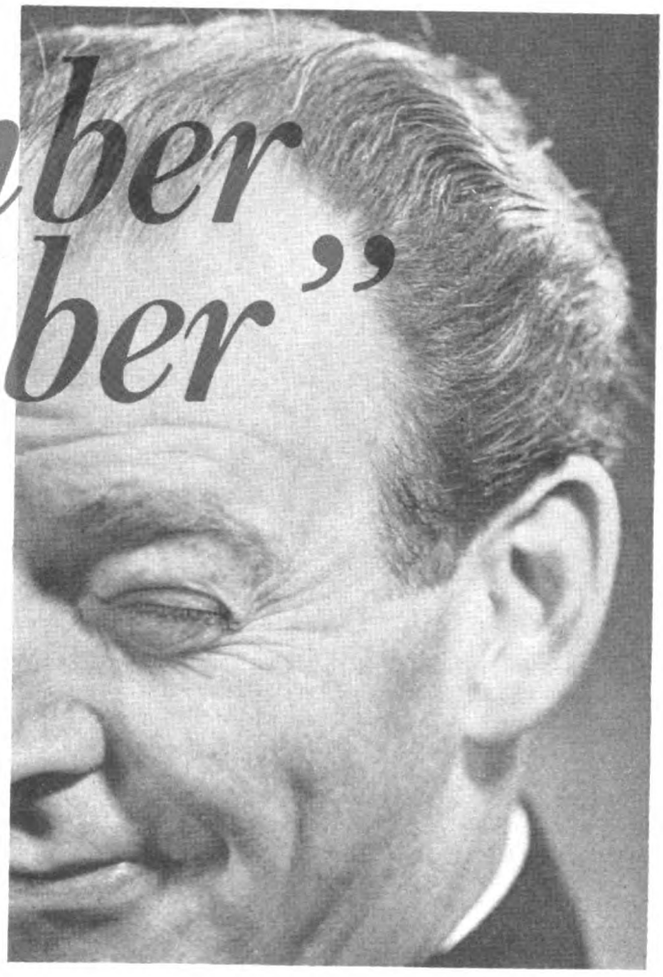
STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY

General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco

Standard Railway Equipment Manufacturing Company, (Canada) Ltd. Sun Life Building, Montreal

progressive mechanical men are saying:

"remember september"

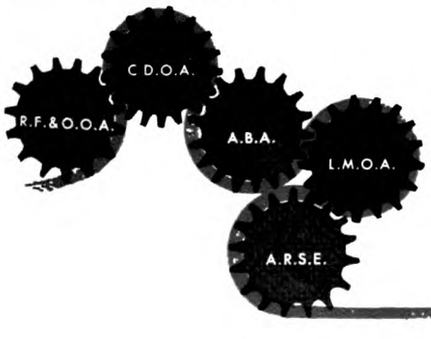


...password to the most important meeting of the year

CHICAGO
HOTEL SHERMAN
SEPT. 15·16·17·18·19

THIS YEAR... *more new* developments and technical advances *than ever* before! Be sure to attend the "idea clinic".

All the newest information, *all* in one place, *all* at one time! *ALL* FIVE MEET AT THE SHERMAN! 4 Mechanical Department Conventions, 1 Allied Railway Supply Exhibit.



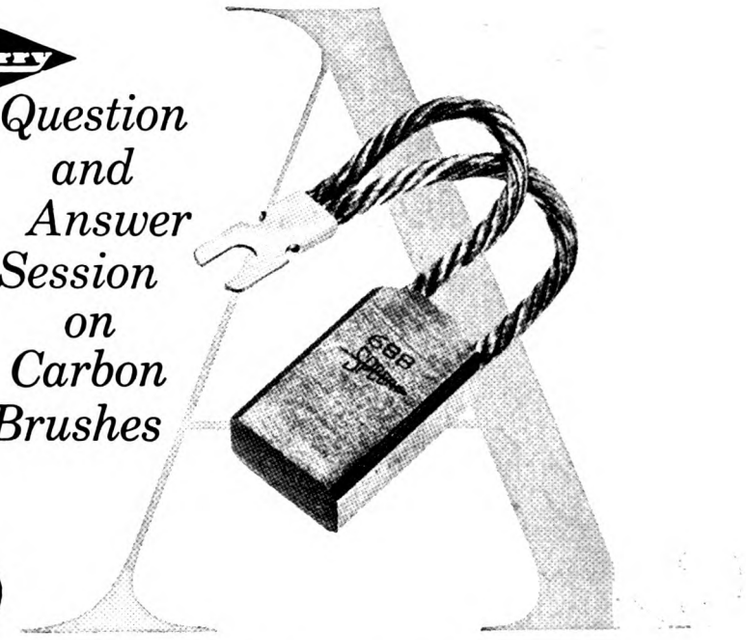
AIR BRAKE ASSOCIATION
CAR DEPARTMENT OFFICERS' ASSOCIATION
LOCOMOTIVE MAINTENANCE OFFICERS' ASSOCIATION

RAILROADS ARE MOVING FORWARD— STAY WITH THEM!

RAILWAY FUEL & OPERATING OFFICERS' ASSOCIATION
THE ALLIED RAILWAY SUPPLY EXHIBIT

Sperry

Question and Answer Session on Carbon Brushes



that says a lot... about QUALITY

Sperry Rail Service, Danbury, Connecticut, designers and operators of Sperry Detector Cars, inspect thousands of miles of rail in track for the nation's foremost railroads. Sperry cars have used Speer Carbon Brushes in their rail current generators since 1935.

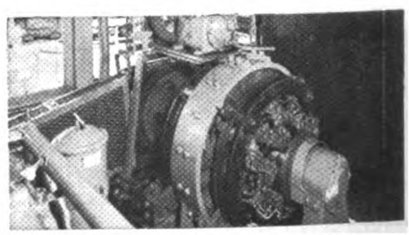
Knowing that there must be some good reasons for long use, we asked the Sperry people to tell us why. Here is their answer:

"In our operations it is important that every Detector Car have a dependable source of high-amperage, low-voltage current for testing purposes under a wide range of temperature and atmospheric conditions. Our cars have had to test in temperatures from 40 to 50 below zero to over 100°F. In the hot climates the generating compartments on our cars reach temperatures of approximately 130°F. The Speer #688 Brushes with their long life, excellent electrical characteristics and good cleaning action have given us the highest performance at lowest cost possible. We have tried other makes but have been unable to find brushes which compare with the ones we are using.

"In every Detector Car we use Speer #688 Brushes on both Rail Current Generators. One of these is a Chandeysson H8-43 Homopolar Generator from which we take 9,000 amps. at voltages from approximately 1.5v to 2.2v. This generator uses 192 brushes. The other is a Chandeysson BP17 Double Commutator Generator from which we take from 1,500 to 2,000 amps. from each side – double these figures for total output, also at voltages of from about 1.0v to 2.0v. Eighty brushes are used per unit. On this generator the commutator mica is not undercut but left flush with the commutator surface. This requires a hard brush with good cleaning action such as the Speer 688.

"The Speer Carbon Company representative has maintained close personal contact with us since we started using Speer brushes. To our way of thinking he is the most competent authority on electrical commutation we know."

This is but one railroad customer reaction to one type of Speer carbon brush for railroad use. Speer brushes can do as much for you and there is a type for every kind of railroad application.



Chandeysson BP17-4000 amperes, 2-volt generator uses 64 #688 Speer Brushes

2 Chandeysson H8-43 Homopolar Generators produce 4500 amperes, 2 volts per unit. Each uses 96 #688 Speer Brushes.

Available for the asking is the book, "Brushes by Speer," which describes the complete line of Speer Brushes.

SPEER Carbon Co.
St. Marys, Pa.

DAVIS

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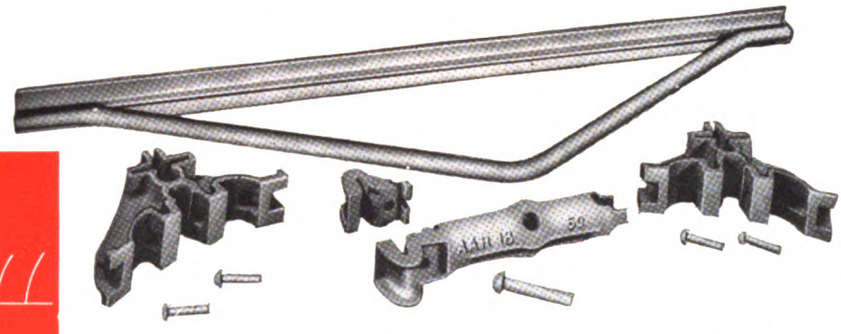
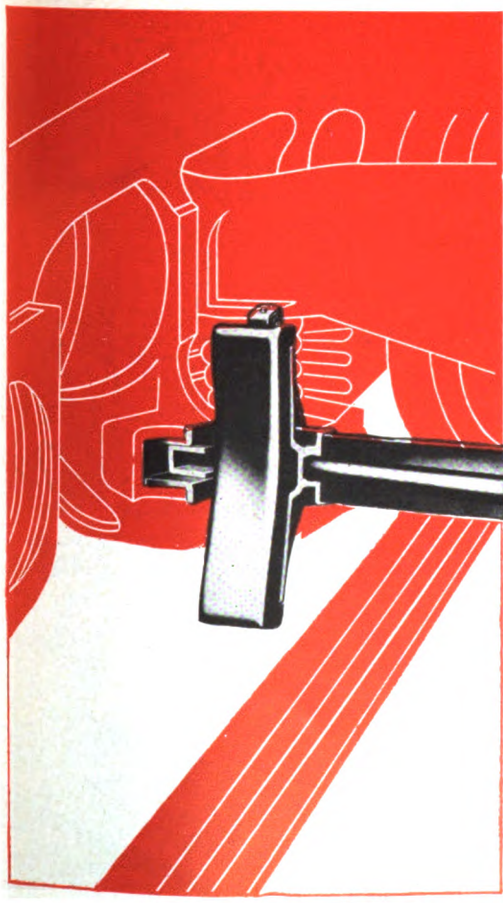
A RECOGNIZED STANDARD FOR MORE THAN 30 YEARS

Whether for Conventional Hanging or for UNIT TRUCKS Davis Solid Truss Brake Beams are DECISIVELY SUPERIOR.





ANY PART RENEWABLE

Without Disturbing the Truss!

OTHER IMPORTANT FEATURES:

- One piece FORGED truss
- No Threaded Rods
- Interchangeable Right and Left Brake Heads Are Easily Applied without Dismantling Truss

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The widespread popularity of Sinclair GASCON® Diesel Engine Lubricating Oils is due to their brilliant performance.

With their high degree of detergency, GASCON Oils keep all parts of a Diesel engine operating clean and free.

It's time you, too, investigated the advantages of this top-quality railroad lubricant. Contact your Sinclair Representative, or write us today.

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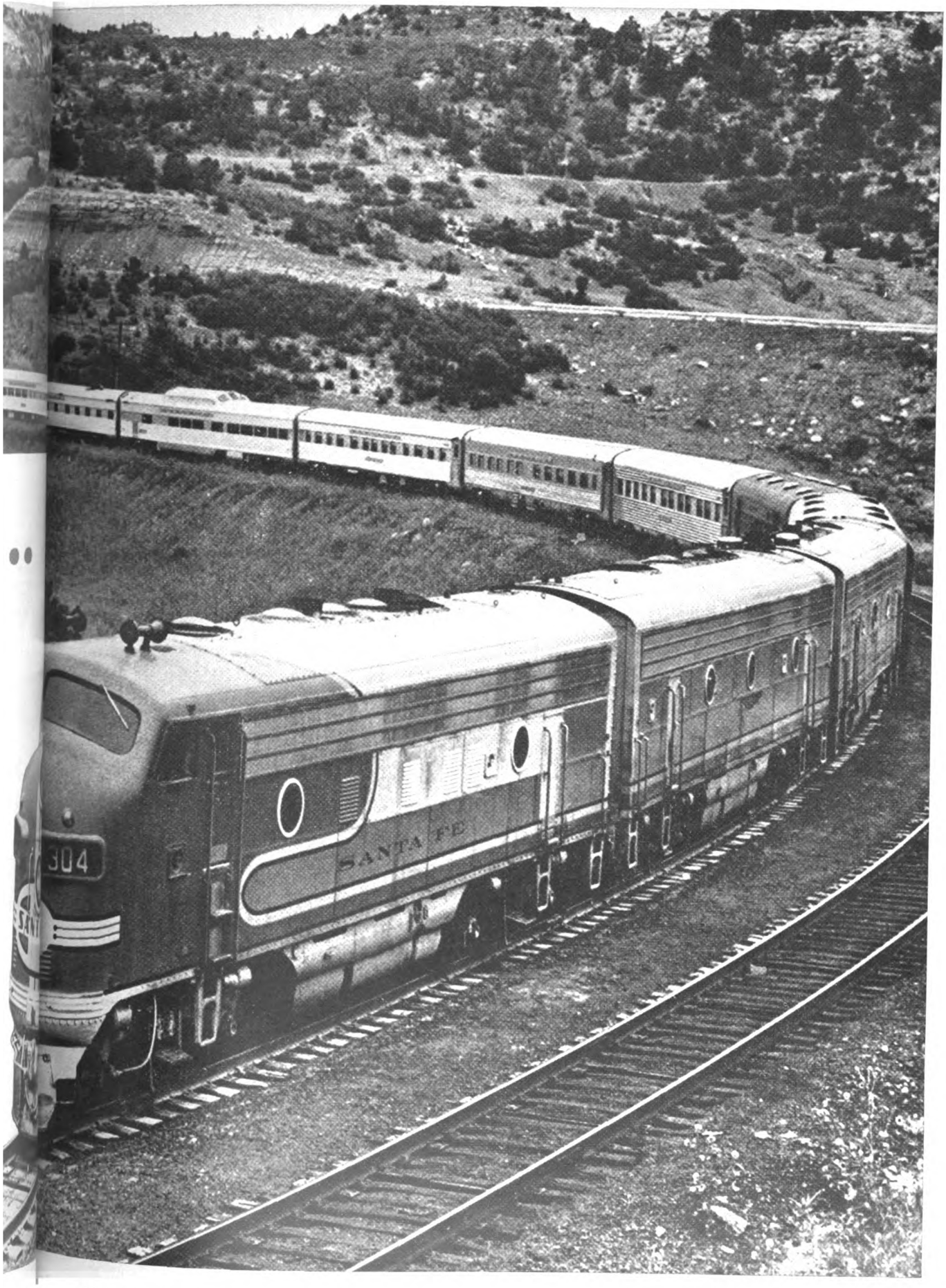

304
SANTA FE

At Pittsburgh & West Virginia Railway

4 years between overhaul

...cast iron cylinder liner wear only .0045" and .003" per 100,000 miles, when protected with* ***AIR-MAZE*** *oil bath filter*

Once it was necessary to overhaul diesels every 18 to 24 months. Now with the Air-Maze oil bath filter, the original oil bath equipped 2000 hp Fairbanks Morse heavy duty unit on this railroad has gone 48 months... 182,000 miles... between overhaul. But that's not all. After 4 years, the original cylinder liners were re-installed without reconditioning.

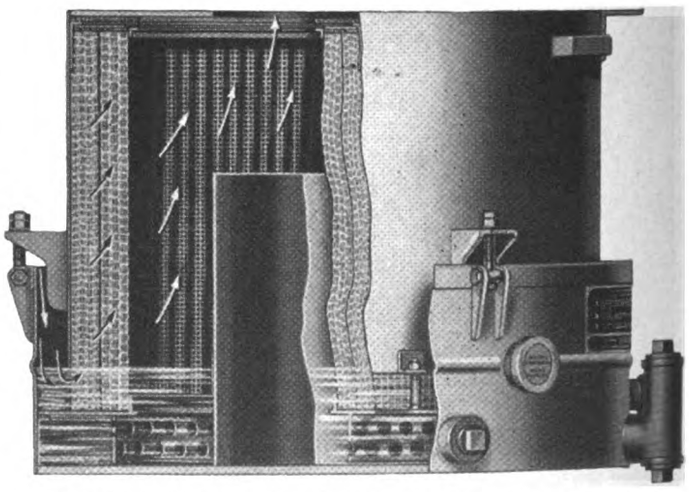
Prior to the oil bath filter, the engine air receivers were wiped every 30 days. Now, less foreign contaminant is found in the manifold in 90 days of service.

With conventional filters, 6 panels must be removed for cleaning and re-oiling every two weeks. The oil bath filter simply requires checking oil level every 30 days, draining and cleaning the bowl every 90 days.

With the Air-Maze oil bath filter, intake air is thoroughly cleaned in a bath of oil. As a result, its inherently higher filtering efficiency is maintained even at lowest engine speeds.

GEARED TO PROGRESS P R I MEMBER

Contact your engine builder or write us for information. Air-Maze Corporation, Cleveland 28, Ohio. Dept. RL-10.



Air-Maze oil bath filter for cleaning intake air to cut engine wear.

**As this is an opposed-piston type engine, liner measurements were taken at points of maximum wear . . . namely, 19-5/8" from top of liner and 19-9/16" from bottom of liner.*

the biggest names in diesels are protected by Air-Maze filters

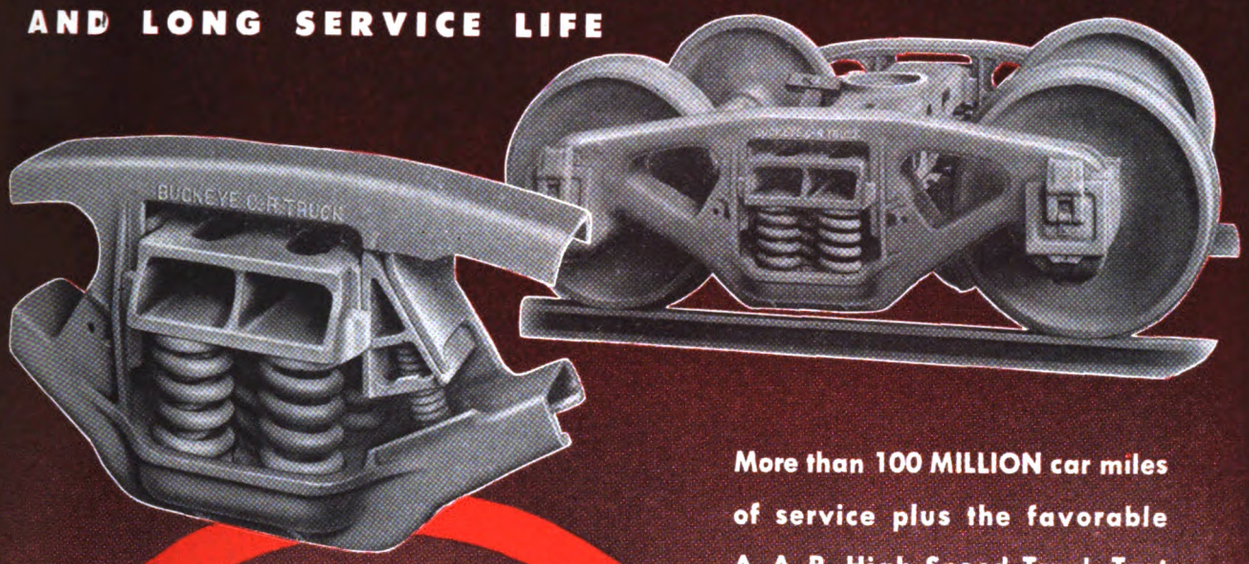
AIR-MAZE

The Filter Engineers

ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • PASSENGER CAR FILTERS

Modern Freight Service..

DEMANDS SUPERIOR RIDING QUALITIES AND LONG SERVICE LIFE



More than 100 MILLION car miles of service plus the favorable A.A.R. High Speed Truck Test results show that your cars will meet these requirements when equipped with

BUCKEYE C-R Trucks

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Ask for Bulletin No 201..

The Buckeye Steel Castings Co.

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for a surge of power
...or steady flow

You can depend on **gould** *batteries*

America's Finest!
GOULD
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Maximum power and long, trouble-free battery life, under *all* operating conditions, are yours with every Gould Battery you buy. And, to insure that you fully realize these benefits, Gould employs a staff of full-time application engineers. These men help you set-up your battery maintenance shop, help you establish sound preventive maintenance procedures, make routine calls to check on conditions, and instruct your new personnel in correct procedures. Do you see how you can increase battery life with this service? Why not talk it over with your local Gould representative. He's listed in the yellow pages under "Batteries." Gould-National Batteries, Inc., Trenton 7, N. J.

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Always Use Gould-National Automobile and Truck Batteries

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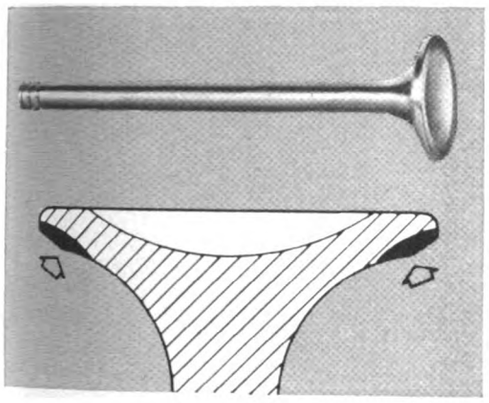
Electro-Motive Parts Progress

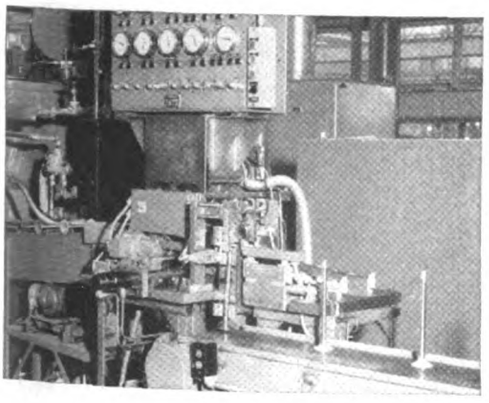
THIS EXHAUST VALVE AVERAGES TWO YEARS SERVICE BEFORE REGRIND



Reasons:

1 *Engine's choice*

Experience has taught us that an engine dictates its own valve needs. Our Model 567 Diesel proved this when previous valve designs of other engines were tried. Exhaustive testing produced the valve shown here, which in normal passenger or freight service runs two years before seat and face regrind. Cutaway view shows special hard Stellite face on valves dictated by our higher horsepower 567C Diesel.



2 *Exclusive manufacture and inspection process*

Manufactured almost entirely by automatic machines, Electro-Motive valves are held to extremely close tolerances. Guarding this precision is a battery of automatic and visual "in-process" inspection controls that assure constant quality and absolute machining accuracy. An example is this electronic machine which checks 14 tolerances at one time on every valve.

3 *Protective packaging*

This special package is used to protect the finely machined surfaces of the valve during handling. Each valve is fitted snugly and protected against moisture with rust preventative V.P.I. paper. Packing like this keeps the valves in perfect condition, always ready for immediate use, and far easier to handle and store.

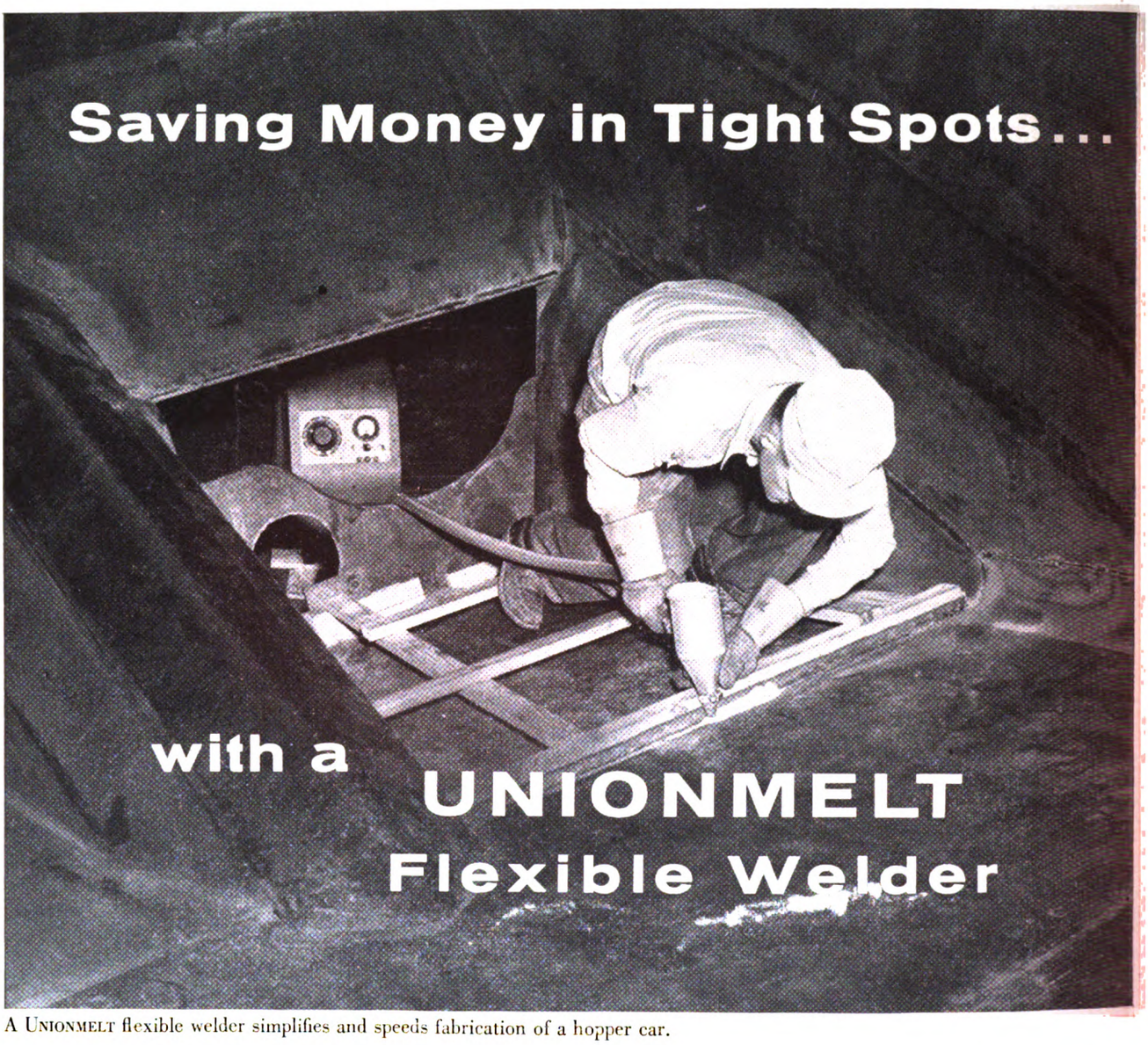
Continuing improvement is an unending program at Electro-Motive to bring you products of highest quality at lowest cost. When you buy General Motors Diesel parts you get components that are designed, engineered and built to work together. In addition, you benefit with a full warranty and convenient, fast delivery from nine strategically located Electro-Motive warehouses.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Ltd., London, Ontario



A UNIONMELT flexible welder simplifies and speeds fabrication of a hopper car.

Wherever flexibility and maneuverability are required in welding, the UNIONMELT flexible welder far outperforms rigid, mechanical installations . . . Welding in corners and in tight spots is no problem with this sturdy portable unit, and top quality welds are produced at speeds up to 40 inches per minute in many operations. The combination hopper and welding head is lightweight, and requires no special skill to operate.

Combines Advantages

This UNIONMELT flexible welder combines the speed of mechanized installations with the operational freedom of manual welding. Wire feed unit and controls are mounted on a mobile carriage which can be moved quickly from one job to another, or from point to point on the same job. Initial investment for flexible welding equipment is considerably less than for stationary automatic welding installations—operations are economical, and maintenance costs are low.

For more information on this and other modern methods for car fabrication, call your local LINDE representative, or write today for free illustrated literature.

RAILROAD DEPARTMENT

LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

The familiar symbol of over forty years' service to the railroad industry.

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"Safety" POWER and CONTROL SYSTEMS

...Unequalled Performance...Low Cost Maintenance

"SAFETY" GENEMOTORS...

surpassed power plants for modern pas-
cars

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ith low cost maintenance . . . "Safety"
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iberal use of armature copper and low loss
ron to keep electrical losses . . . therefore
eating . . . at a minimum

rmatures insulated with Class B material
nd mounted on shafts of the best alloy
steel procurable

dc armature, ac rotor and cooling fan easily
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ll parts dynamically balanced individually
before assembly on the shaft . . . assuring
full interchangeability

an automatic polarity reversing switch . . .
eliminating maintenance of an additional
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nal ratings, with 20 or 32 HP AC, 60 cycle,
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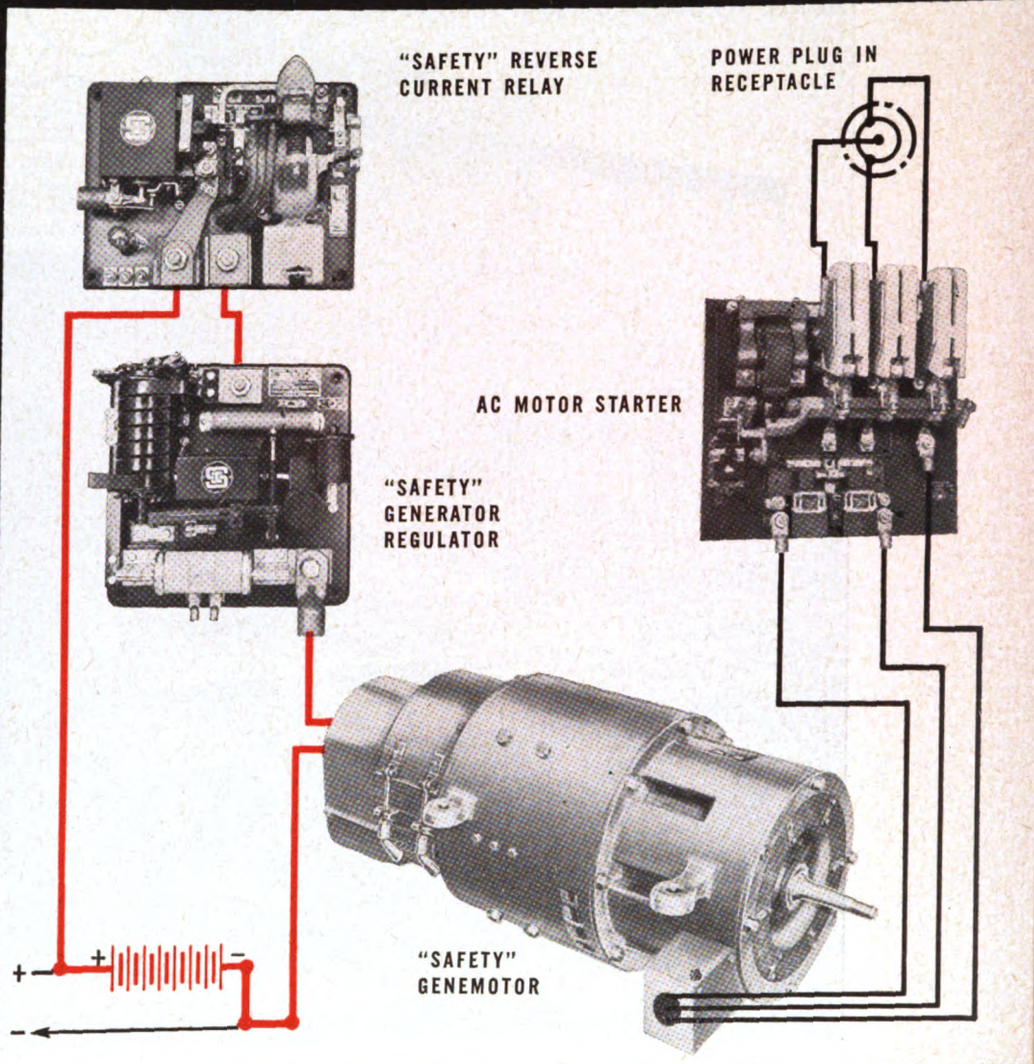


AFETY" ONTROL EQUIPMENT...

provides constant voltage regulation and positive current limit for maximum Genemotor protection

lengthens battery life

is compact and automatic

requires minimum locker space

is simple in design . . . requiring little maintenance . . . thereby reducing labor costs

"SAFETY" GENEMOTORS and CONTROL EQUIPMENT PROVIDE...

- constant voltage power for all air conditioning electrical equipment and lighting
- full output at very low train speeds . . . assuring quick power availability for re-charging low batteries while cars are enroute
- standby power in excess of requirements for pre-cooling cars and battery charging

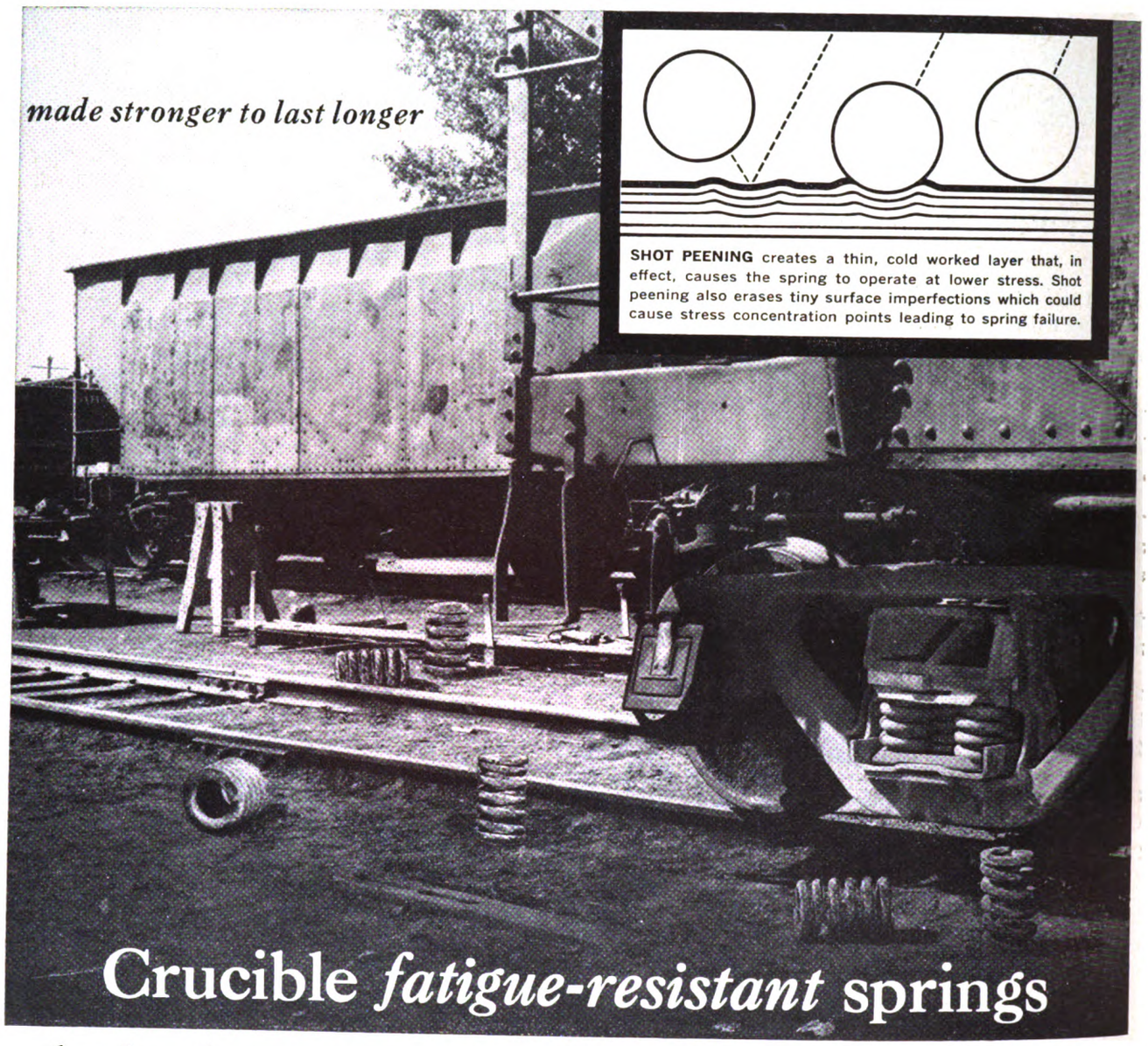
Over 5,000 "Safety" Genemotor and Control Equipment applications on railroads throughout the United States, Canada and Mexico are actual proof of unparalleled performance in service.

SAFETY INDUSTRIES, INC.

FORMERLY THE SAFETY CAR HEATING & LIGHTING COMPANY, INC.

NEW YORK • CHICAGO • PHILADELPHIA • RICHMOND • ST. LOUIS • SAN FRANCISCO • NEW HAVEN • MONTREAL

"SAFETY" PRODUCTS INCLUDE: Air-conditioning Equipment • Genemotors • Generators • Fans • Regulators • Blower Units



help keep cars off the repair tracks

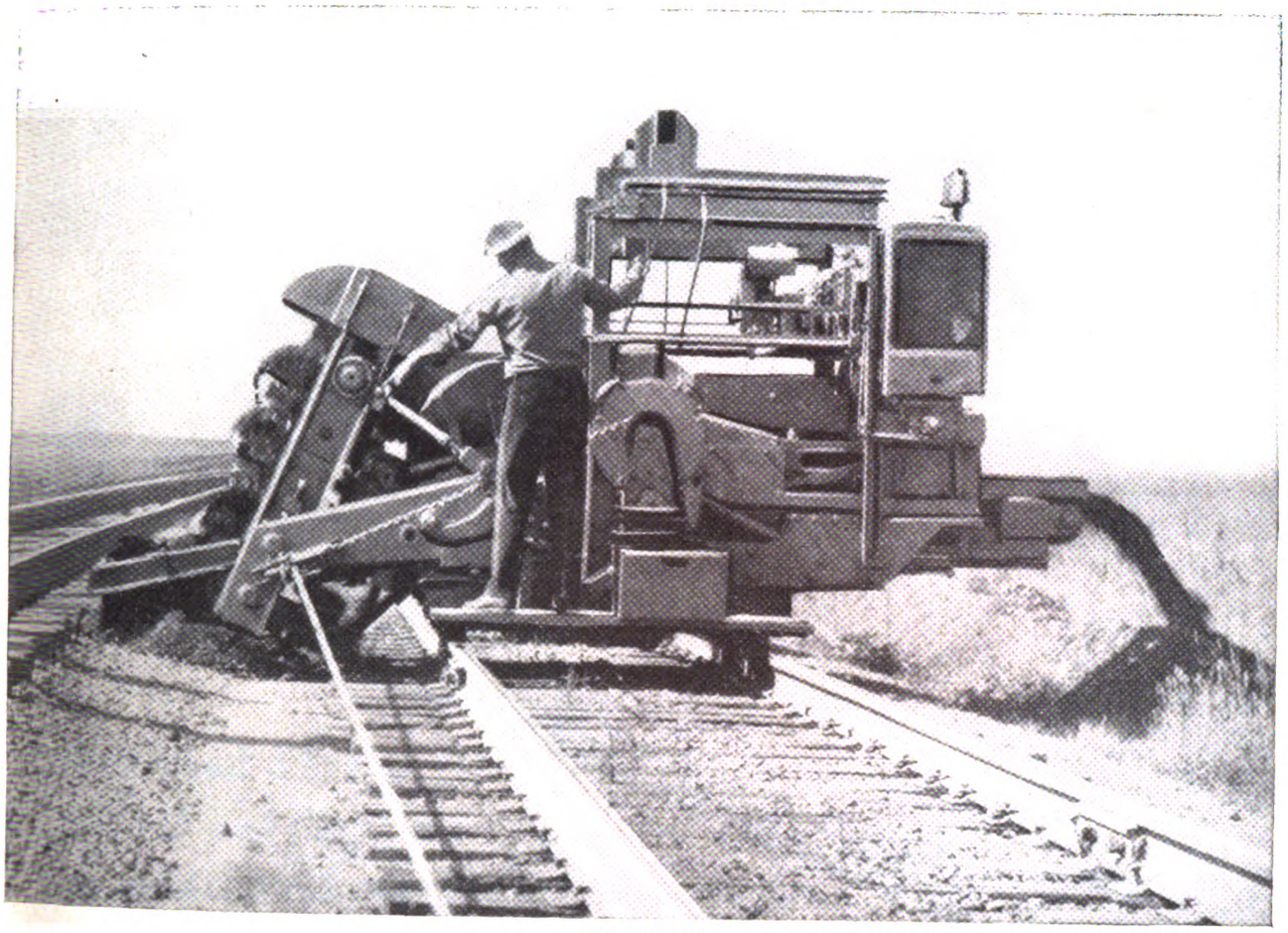
Three major railroads report: 90% of all car springs fail due to permanent set – only 10% due to other causes. You can reduce the frequency of failures by using Crucible's single heat treated *fatigue-resistant* springs. They're *made stronger to last longer*, yet cost no more than conventional springs.

Crucible *fatigue-resistant* springs are stronger because they're single heat treated and shot peened. These processes provide better hardenability, higher elastic limits and greater resistance to working stresses.

Help keep cars off the repair tracks and reduce "bad-order" car expenses by using Crucible *fatigue-resistant* springs. They're your best guarantee of long, low-cost spring service. For further details, write for folder: *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

CRUCIBLE spring division

Crucible Steel Company of America



This machine for excavating intertrack ballast is only one of the many different types of track maintenance equipment lubricated with ESSO MULTI-PURPOSE GREASE H.

One grease for many uses—
ESSO MULTI-PURPOSE GREASE H simplifies maintenance

For all types of maintenance-of-way equipment ... ESSO MULTI-PURPOSE GREASE H. It is an ideal lubricant for such diverse equipment as ballast cleaners, tampers, cribbers, screeners and many other pieces of machinery, including automotive and construction equipment. The use of *one* grease instead of many is more efficient, more economical. Because of these benefits, more and more railroads have come to use and depend on ESSO MULTI-PURPOSE GREASE H.

THREE IMPORTANT ADVANTAGES back the use of ESSO MULTI-PURPOSE GREASE H:

1. Outstanding in quality, it has been proved on the road and in the lab in a multitude of applications. Meeting the rigid requirements for automotive wheel bearings, it performs equally well in applications requiring a general purpose grease.
2. ONE grease performs in many applications, eliminating the need for a large variety of greases. It prevents application of the wrong grease and possible damage to machinery.
3. Storage and handling problems are reduced to a minimum, resulting in greater economy. It is easier to protect a single container of ESSO MULTI-PURPOSE GREASE H against contamination than several partially empty special-purpose drums.

ESSO

RAILROAD PRODUCTS

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.

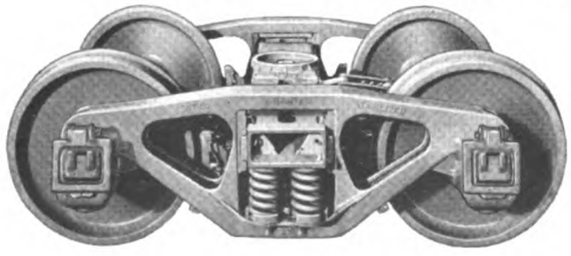
SM-O-O-THER CAR-GO... PROTECTS VALUABLE CARGO

Higher speeds! Tighter schedules! These combine to give equipment and ladings many opportunities to become damaged. Damage claims are a serious problem for any road.

Barber Stabilized Trucks give smoother rides, maximum protection. Destructive forces are self-dampened through the coordinated action of Barber Stabilizer components. Actuating springs, friction shoes and special wear plates . . . arranged in a unique and ever-ready suspension system . . . guard against vertical shocks and bouncing, increase their frictional resistance on the downward stroke. **Over-solid spring blows are eliminated!**

Two bargains in one! Barber Stabilized Trucks save your ladings; save your equipment.

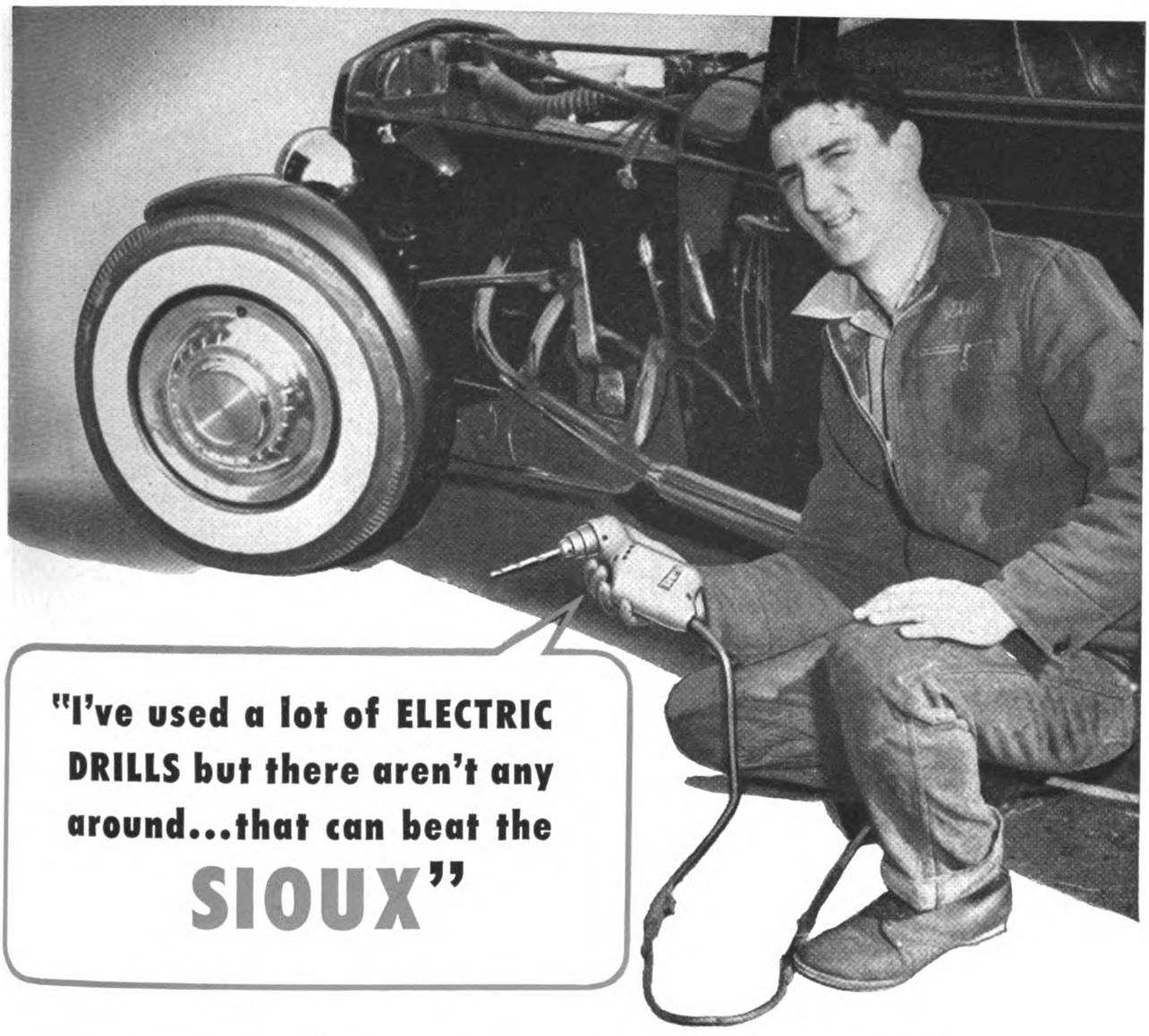
Quicker, Easier Servicing, Too . . .



BARBER

STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.



"I've used a lot of ELECTRIC DRILLS but there aren't any around...that can beat the SIOUX"

"I've been meaning to write this letter to you people for a very long time. In 1952 I bought a 6" Ball Bearing Bench Grinder, a Half Inch Heavy Duty Drill and also a No. 1495 ¼" ALL-ANGLE Drill. In all that time I haven't had a bit of trouble with any of these tools.

All three tools are great, but the ¼" ALL-ANGLE Drill is the reason I'm writing this letter. *I've used a lot of electric drills but there isn't any around that is made that can beat the SIOUX.* With that drill, you can get into the tightest place that you can put your fist into.

You can put oversize drills into it and it won't die out on you. It's the most compact, the most rugged piece of equipment I've used. It couldn't be designed any better, I don't think, and whoever had the brains to design that really deserves a lot of credit.

He must have had us in mind when he designed it because it's *perfect.* In our kind of work we have to be fussy and we don't pass out compliments too easy, but there are so many poorly designed tools for sale, that I really thought you deserved these compliments.

I've never written to a manufacturer before but I appreciate working with good tools and I have to give your drill a lot of credit for our prize winning cars. A lot of people have bought the offset drill after using mine. It sells itself very easily.

You're perfectly welcome to do as you please with this letter, and I would endorse any of your products."

JOHN SHARRIGAN, Watertown, Mass.

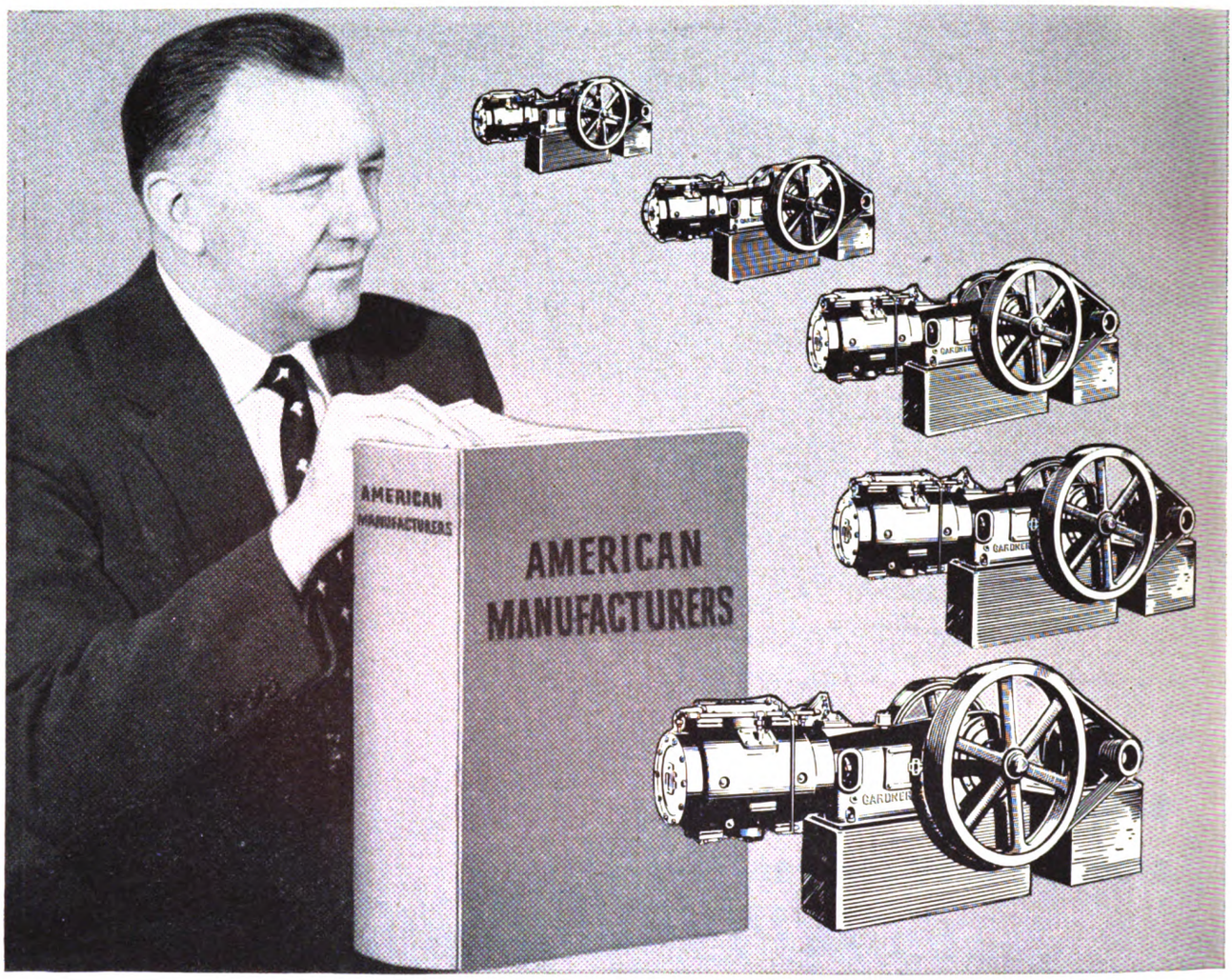
SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

LOOK UNDER ELECTRIC TOOLS

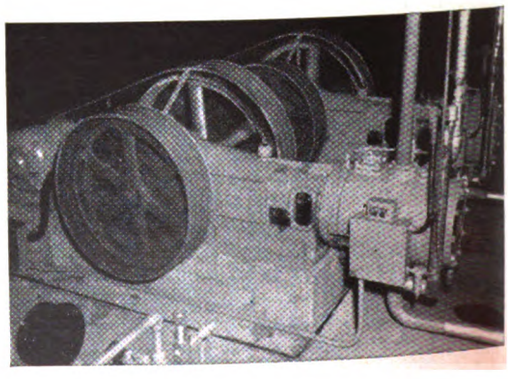
ELECTRIC DRILLS • SCREW DRIVERS • SANDERS • GRINDERS • IMPACT WRENCHES • VALVE FACE GRINDING MACHINES • POLISHERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS



Known by the companies that keep it the Gardner-Denver RX compressor

Manufacturers that depend on the RX know it delivers more than air. It delivers years of trouble-free service and economy. Underneath its sturdy main frame are compressor parts engineered to run round-the-clock. Parts easy to inspect and adjust. Designed for smoother operation, better balance and lowest power consumption.

Full details of RX models from 100 to 1410 cfm piston displacement, for pressures from 15 to 150 psi, are described in Gardner-Denver Bulletin HAC-40. Write today.



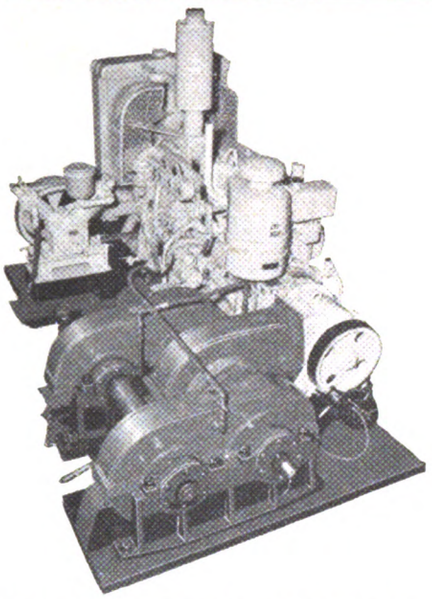
RX installation being used for instrument air in power and light company.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

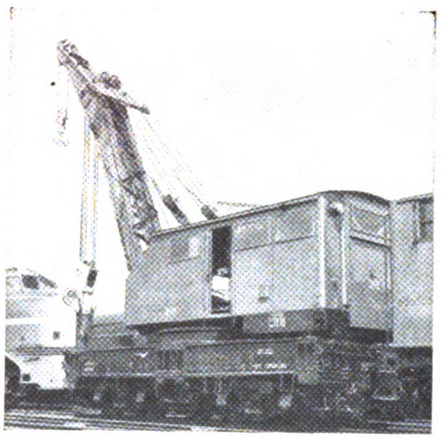
GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

HOW SUBSTANTIAL SAVINGS IN LOCOMOTIVE CRANE FUEL COSTS ARE BEING MADE WITH THESE STEAM-TO-DIESEL CONVERSION UNITS



The economy of diesel engine operation is such that, with savings on both lower fuel and lower maintenance costs, the initial expenditure on a Brownhoist Diesel Conversion Unit is soon amortized. Brownhoist Conversion Units are engineered to the individual requirements of your crane. The component parts consist of the diesel engine, the torque converter, the roller bearing mounted friction clutches, and the air compressor . . . all mounted on a heavy one-piece slab base ready for installation. These units are completely assembled and tested before shipment to you, and the conversion bill-of-material becomes a permanent part of your crane record, to expedite future service. Write today or contact your Industrial Brownhoist representative (give crane serial number).



THIS 1925 150 TON WRECKER WAS STEAM, IS NOW DIESEL RESULT:

LOWER OPERATING COSTS

This Brownhoist 150 Ton Steam Wrecking Crane, built in 1925, was recently adapted to diesel with one of our conversion units. Its operators report a substantial savings in maintenance and fuel bills, more than justifying the cost of conversion.

BROWNHOIST

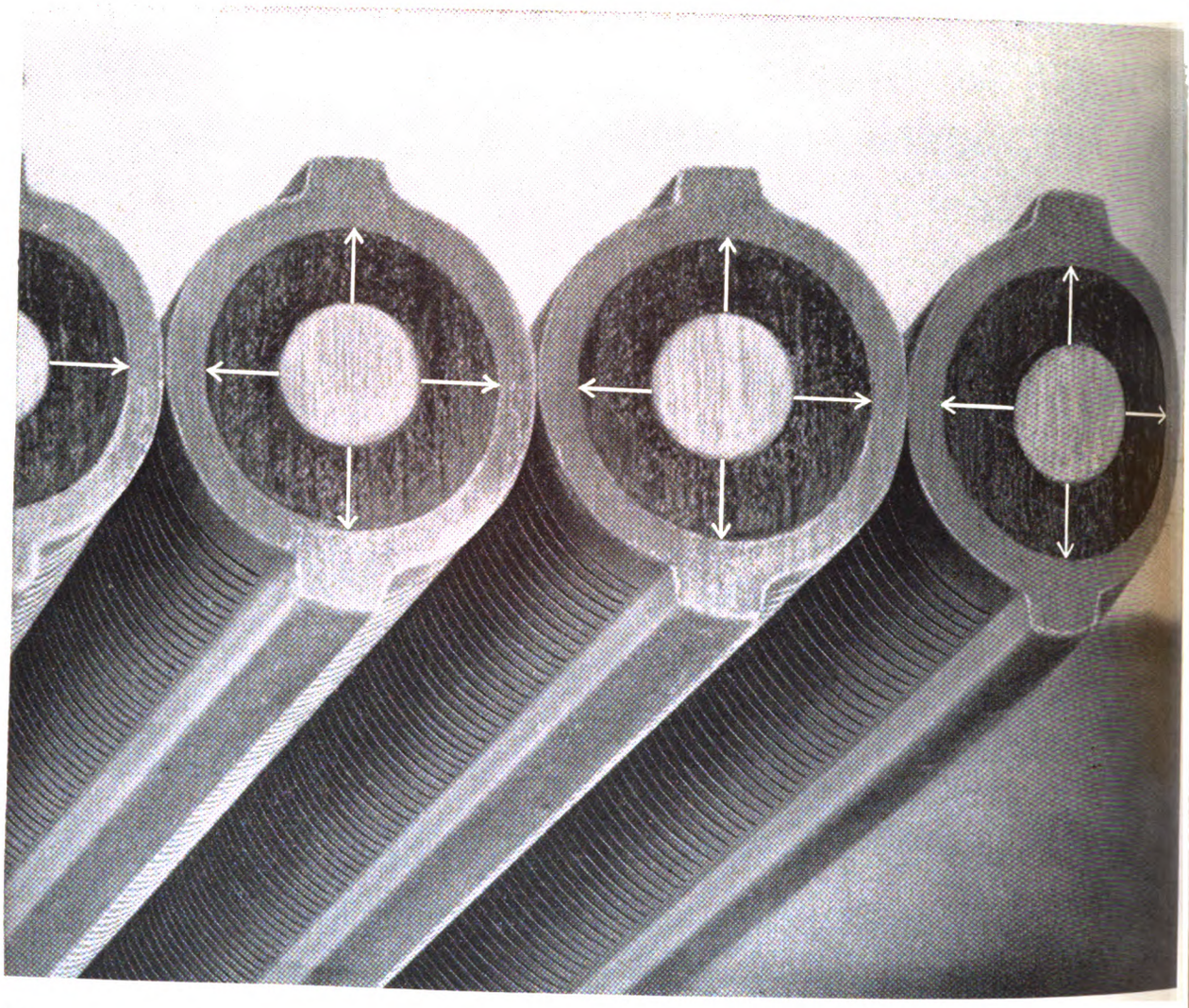
BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

SUBSIDIARY OF Penn-Texas CORPORATION

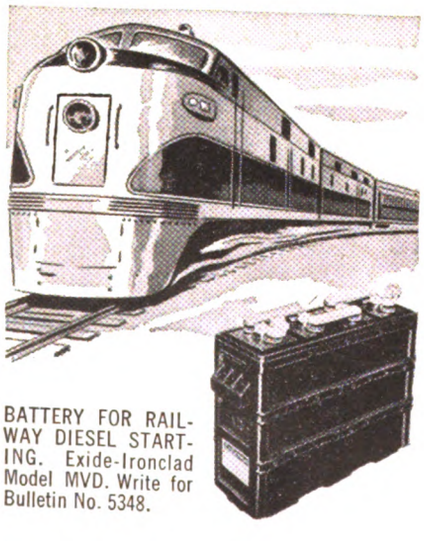
INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: Philadelphia, Washington, Cleveland, Chicago, San Francisco, Montreal
AGENCIES: Detroit, Birmingham, Houston

EXIDE-IRONCLAD BATTERIES

For railway diesel starting



Power tubes expand without shedding — preserve battery life



BATTERY FOR RAILWAY DIESEL STARTING. Exide-Ironclad Model MVD. Write for Bulletin No. 5348.

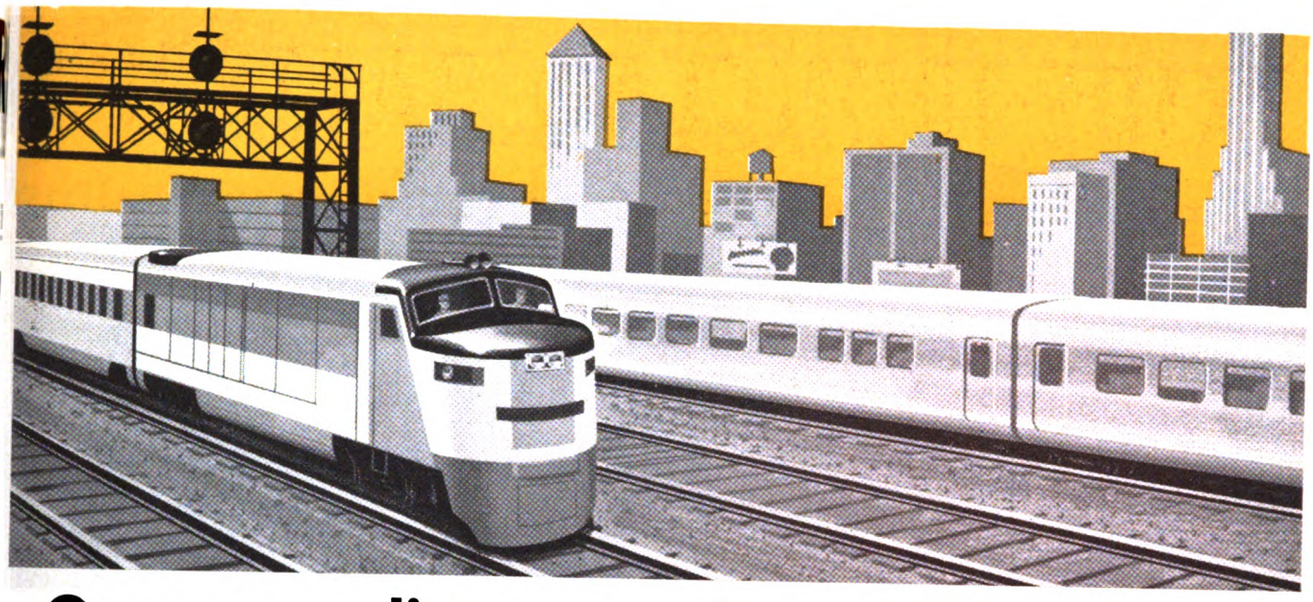
Every time you discharge a storage battery, the active material on the positive plates expands. But the plate grids don't expand. This is basic.

On most batteries, the expanding active material tends to shear off from the nonexpanding grid every time the action takes place. But this can't happen in the Exide-Ironclad Battery. The reason is simple.

Active material is formed concentrically around the spinelike grid and held inside the plastic tubes. Expansion is predominantly in an outward direction—hence no shearing. Active material remains firmly locked to the underlying grid structure. And the flexible plastic tubes yield and take up as needed.

This extra protection against shedding of active material is only one of the many reasons for the long life of Exide-Ironclad Batteries. When you order heavy duty batteries, or the equipment requiring them, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®



On express lines . . . and at whistle stops . . .

The performance and the brand are the same around the world

Other Outstanding Shell Industrial Lubricants

Shell Tellus Oil—for closed hydraulic systems

Shell Alvania Grease—multi-purpose industrial lubricant

Shell Turbo Oil—for utility, industrial & marine turbines

Shell Dromus Oils—cutting oils for high-production metalworking

Shell Rimula Oil—for heavy-duty diesel engines

SHELL TALONA R Oil 40 offers two outstanding reasons for its acceptance as a top-rated diesel-electric locomotive lubricant. It provides superior anti-wear protection and maintains engine performance.

Greatly reduced wear on pistons, rings and cylinder liners is assured because of the selected combination of additives used in Talona® R Oil 40. It has high oxidation stability, combined with resistance toward corrosion and sludge formation. It prevents ring fouling and provides excellent detergent-dispersant action.

Today—railroad operators abroad can enjoy the same Talona R Oil 40 the domestic carriers rely upon. For complete information, write to Shell Oil Company, 50 West 50th St., New York 20, N.Y., or 100 Bush Street, San Francisco 6, Calif.

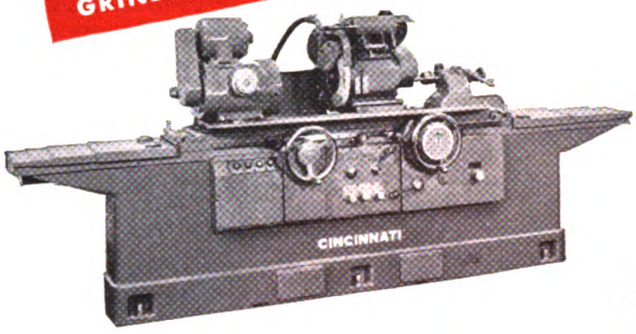
SHELL TALONA R OIL 40

SHELL

Cincinnati's setup timesavers

reduce cost of your small lot precision grinding

CINCINNATI® FILMATIC 12" x 36" UNIVERSAL GRINDING MACHINE



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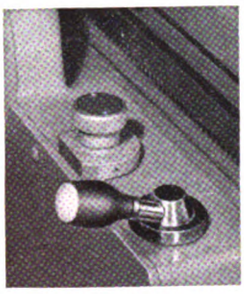

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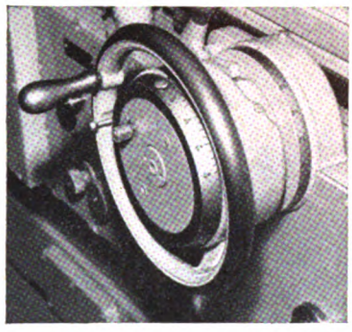

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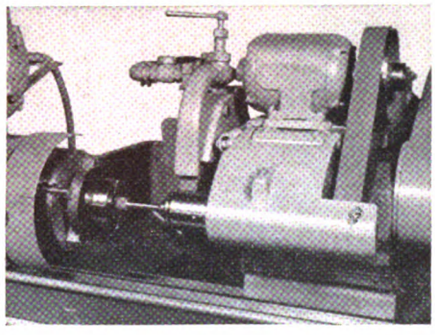

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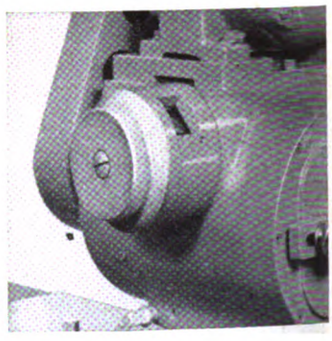

Small manufacturing quantities may be good for inventory accounting, but they're tough on costs. In precision toolroom grinding, CINCINNATI® FILMATIC Universals offer several ways to eliminate or greatly reduce the setup element of cost.

1 **Power rapid positioning** of wheelhead. Saves time and energy, especially when setting up for widely varying diameters (extra equipment).

2 **FILMATIC grinding wheel spindle bearings** require no adjustment for any job assigned to the machine.

3 **Two-speed cross feed mechanism** facilitates multiple diameter grinding; incorporates pickfeed all the way to final size.

4 **Internal grinding unit** is hinged at the front of the wheelhead casting, always ready for internal work.

5 **Instant work speed selection** for the diameter being ground. Just turn the dial with one hand, that's all there is to it.

Other ways in which new CINCINNATI FILMATIC 12", 14", 18" Universal Grinders can reduce costs in your shop are outlined in catalog No. G-663-1. May we send a copy to you? You will find brief specifications in Sweet's.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

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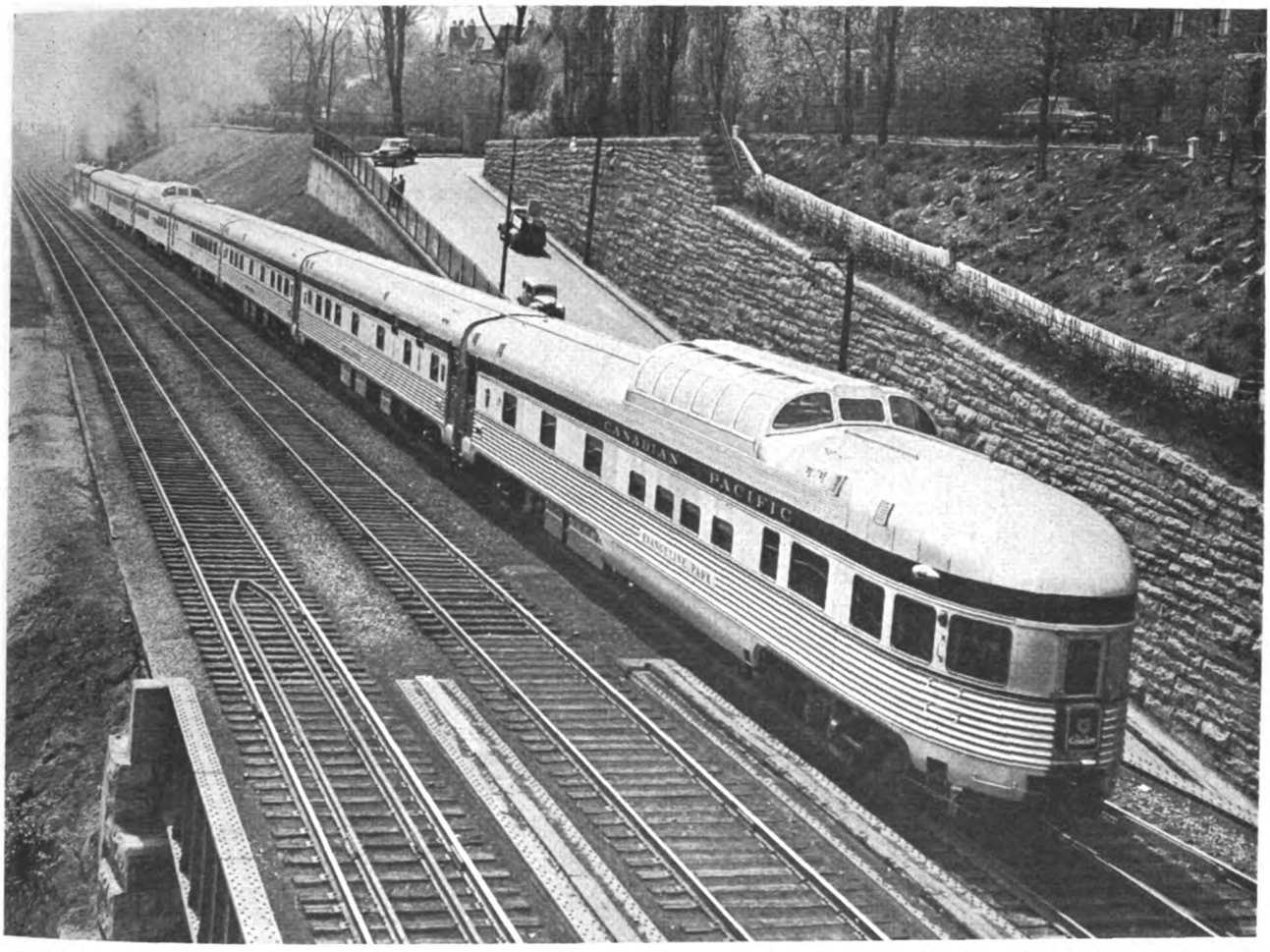
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE GRINDING MACHINES • CHUCKING GRINDERS • MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES



Afternoon departure of "Canadian" from Montreal finds cars prepared for 2,881-mile run to Vancouver. Another section leaves Toronto and is merged with this one at Sudbury, Ont., to form the 15-car train which makes most of the transcontinental trip.

With Records and Scheduling . . .

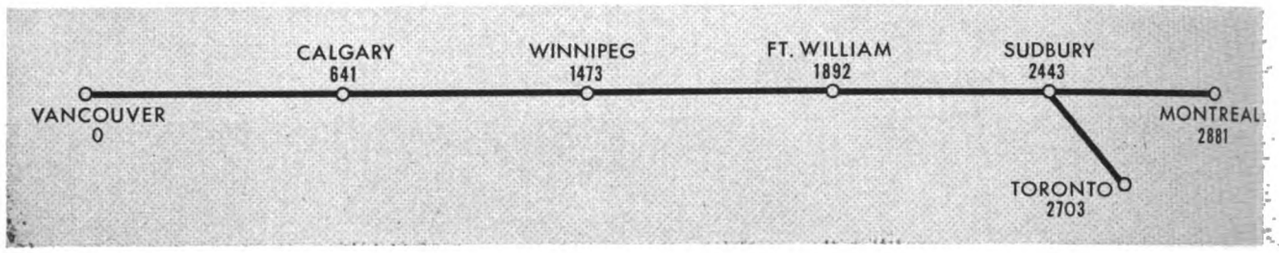
CPR Plans To Keep 'Canadians' on the Road

Progressive preventive maintenance is intended to insure that 173 Budd-built stainless-steel cars will not spend any time in Canadian Pacific back shops for class repairs.

Part I

Everything about the design, servicing and operation of the Canadian Pacific's 173 stainless-steel passenger cars has been worked out to keep them on the road. Most of the CPR's transcontinental passengers are handled in these coaches, sleepers and dining cars. The Canadian Pacific has one of the most elaborate preventive maintenance programs ever worked out for a passenger car fleet.

The entire operation is based on the assumption that the cars are not to be back shopped for routine heavy repairs. Scheduling is worked



Most of the Canadian Pacific's streamlined, stainless-steel passenger equipment operates over the railroad's transcontinental main line. Indicated are terminals where maintenance or servicing is carried on, a nd the figures indicate mileages from Vancouver.

out to do the heaviest maintenance and overhaul jobs while the cars lay over between each of their transcontinental trips.

A big factor in the choice of stainless-steel equipment was that it would not require exterior painting, and that it would be unnecessary to inspect and paint the car structures at regular intervals. At the same time, the CPR insisted on plastic laminated interior walls, doors, ceilings and partitions so that the cars would not require extensive inside painting.

While these cars were being designed and built by Budd, the CPR's chief of motive power and rolling stock was making plans for their servicing and maintenance. The CPR had no prior experience with the operation of stainless-steel, lightweight cars.

The "Canadian" Fleet

The cars, which Budd was then b ıilding for the CPR, were to equip a new transcontinental train—"The Canadian" — and to put some streamlined equipment on the "Dominion," the train which until then had been the "flagship" of the CPR passenger fleet. (*Railway Locomotives and Cars,* December 1954, p. 47). The order consisted of the following:

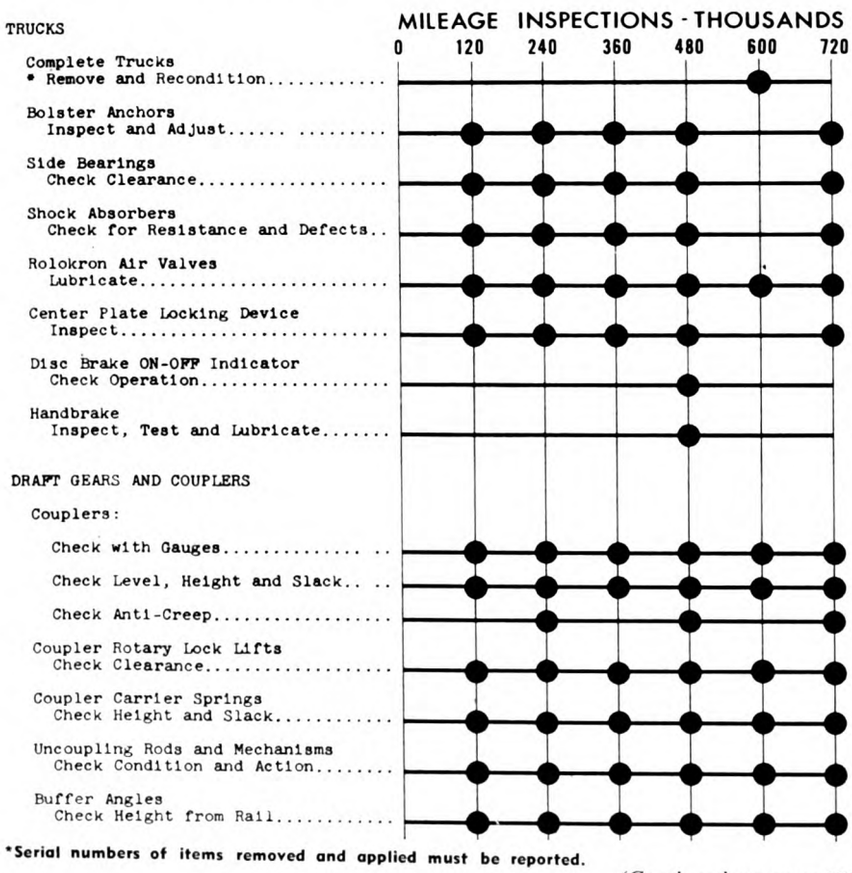
- 18 Cars — Dome, observation, lounge, 3 double-bedroom, 1 drawing-room sleeper ("Park" series).
- 29 Cars—8 duplex-roomette, 3 double-bedroom, 1 drawing-room, 4 section sleeper ("Chateau" series).
- 42 Cars—4 section, 4 roomette, 5 double-bedroom, 1 compartment sleeper ("Manor" series).
- 30 Cars—60-seat coach (100-129 series).
- 18 Cars—Dome, coffee shop, 26-seat coach (500-517 series).
- 18 Cars—Dining Car.
- 18 Cars—Baggage — dormitory car (3000-3017 series).

In use today these cars are assembled into seven complete trains of "Canadian" equipment, and the balance of the cars are used in the "Dominion." There are some extra coaches and sleepers at times assigned to runs such as Montreal-Toronto and Montreal-Saint John, N. B.

The "Canadian" takes 70 hr for the 2,881-mile Vancouver—Montreal trip, and the "Dominion" has an 83-hr schedule for this same run. Both the "Dominion" and the "Canadian" start from and terminate at two eastern terminals—Montreal and Toronto. The Montreal and Toronto sections of each train merge into a single train at Sudbury, Ont., for the 2,444-mile run to Vancouver.

The dome cars were ordered without any spares. To cover the assignments specified in the public timetables requires that none of these 36 cars ever miss a trip. Studies of the procedures used on

This Is CPR Maintenance Schedule



***Serial numbers of items removed and applied must be reported.**

(Continued on page 37)

U. S. railroads and a knowledge of the service to which the new cars would be assigned led the CPR to establish a complete progressive maintenance program for all of the 173 cars. This puts maintenance of all important mechanical and electrical items on every car on a mileage inspection and overhaul basis, and has required the same sort of records and control that are typical for aircraft and diesel locomotive operations.

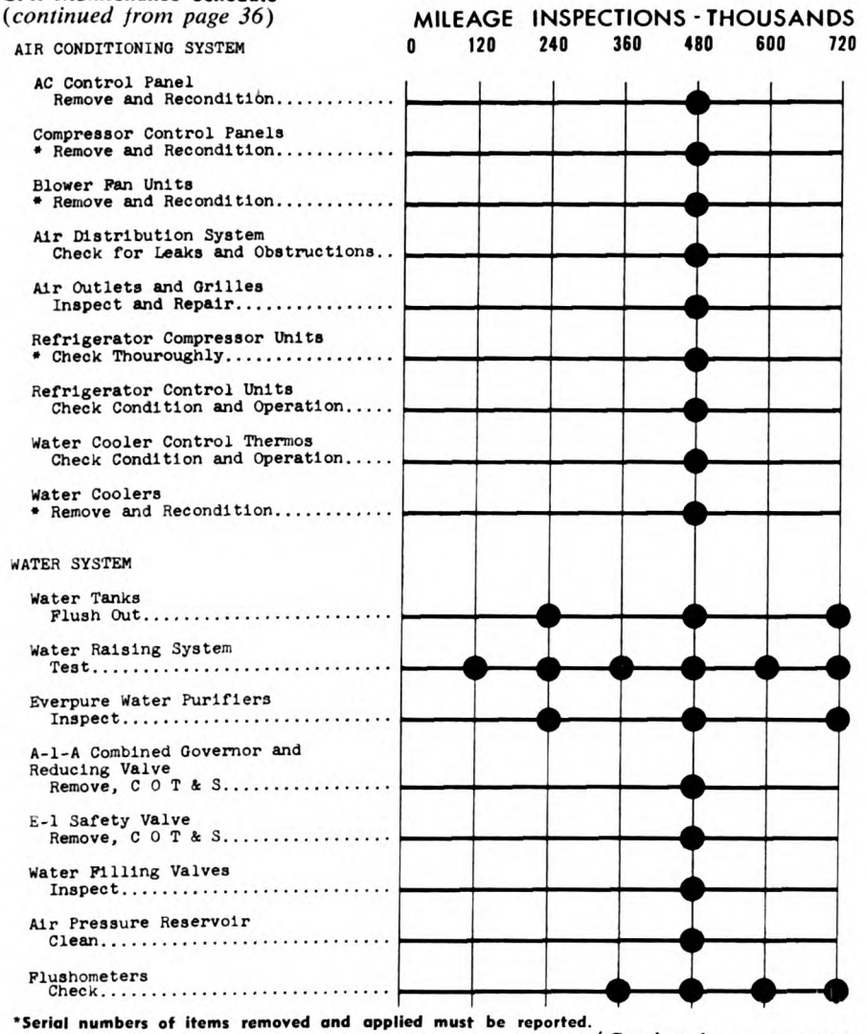
Establishing the Program

The first car was delivered in July 1954, and the last cars came from Budd about a year later. The CPR began to apply serial numbers to every major mechanical and electrical component on every car when it arrived from the builder. Most items under the cars have embossed metal tags showing the CPR serial numbers, and interior units and protected equipment have ½- or 1-in. painted serial numbers stencilled on them. Items receiving serial numbers were the following (separate numbers if there are two or more such components on the one car):

Trucks
Spicer Drive
Spicer Drive Shaft
Spicer Clutch
Genemotor
Batteries
Motor Generator Set
Compressor
Condenser Motors
Generator Regulator
Reverse Current Relay
Lamp Regulator
Motor Generator Starter Panel
Vibrator
Compressor Starter Panel
Blower Fan Motors
Exhaust Fan Motors
Water Cooler Motors
Water Cooler Pump Motor
Refrigerator Motors
Water Cooler

A Kardex record system was established in the office of the chief of motive power and rolling stock in Montreal. Information from the serial numbering of all the components supplied the initial data for an individual card for each component on every car in the order, the "Component Removal, Failure and Overhaul Record." This card shows the name of the component and its rating, then gives the CPR serial number and that applied by the manufacturer. Continuous posting shows the original application and a continuing history of every item. These record can point out weaknesses in parts, or can be the basis for extending the mileage removal period.

CPR Maintenance Schedule
(*continued from page 36*)



***Serial numbers of items removed and applied must be reported.**

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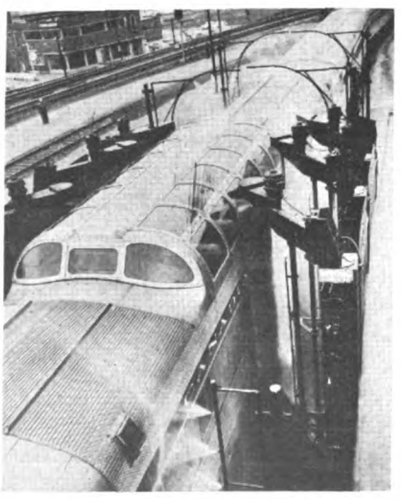


Car washing is mechanized at Vancouver, Calgary and Toronto (above). Car cleaning procedure was an integral part of the planning which has made the cross-country operations of the streamlined "Canadians" and "Dominions" successful.

A second file of cards in the system is the "Passenger Car Mileage Record." There is an individual card for each of the 173 stainless-steel cars, and each is posted monthly with the mileage accumulated that month, and with the total accumulated mileage to that date. These cards supply the mileage which is the basis for ordering the periodic preventive maintenance programs for each car.

The third Kardex record is a record of this periodic preventive maintenance work. It indicates the date when the maintenance terminal was advised that the car was due for mileage work. After the terminal has reported back, the card is posted to indicate when the mileage repairs were completed.

Once the preventive maintenance

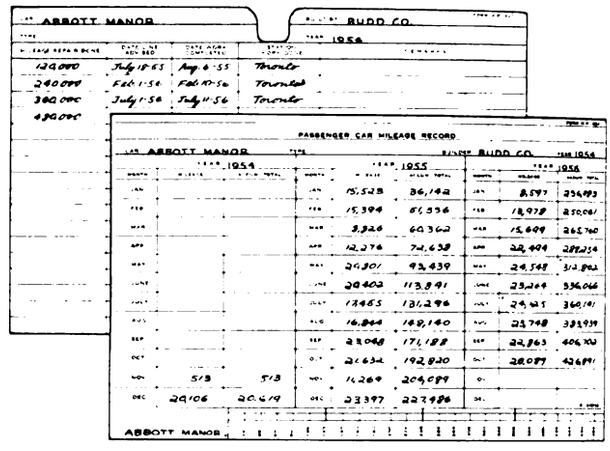
CANADIAN PACIFIC RAILWAY COMPANY

M.P. 614

MONTHLY COMPONENT REPLACEMENT REPORT
STAINLESS STEEL PASSENGER CARS

DATE	NAME OF COMPONENT	COMPONENT SERIAL NUMBER		CAR NAME OR NUMBER	REASON FOR REMOVAL
		REMOVED	APPLIED		
1st	5 HLH-31 Exide Cells	3087	3185	Cameron Manor	Cells Leaking
2nd	Spicer Clutch	186	230	Burton Manor	360,000 Mile Inspection
2nd	Water Cooler	144	218	Douglas Manor	Freon Leaks
3rd	3-KW Alternator	176	179	Cornwall Manor	Bearing noisy

What was replaced and why are indicated by monthly reports filed by each of the maintenance terminals such as this report from the general car foreman at Toronto Union Station. This data then goes on to the Kardex records.



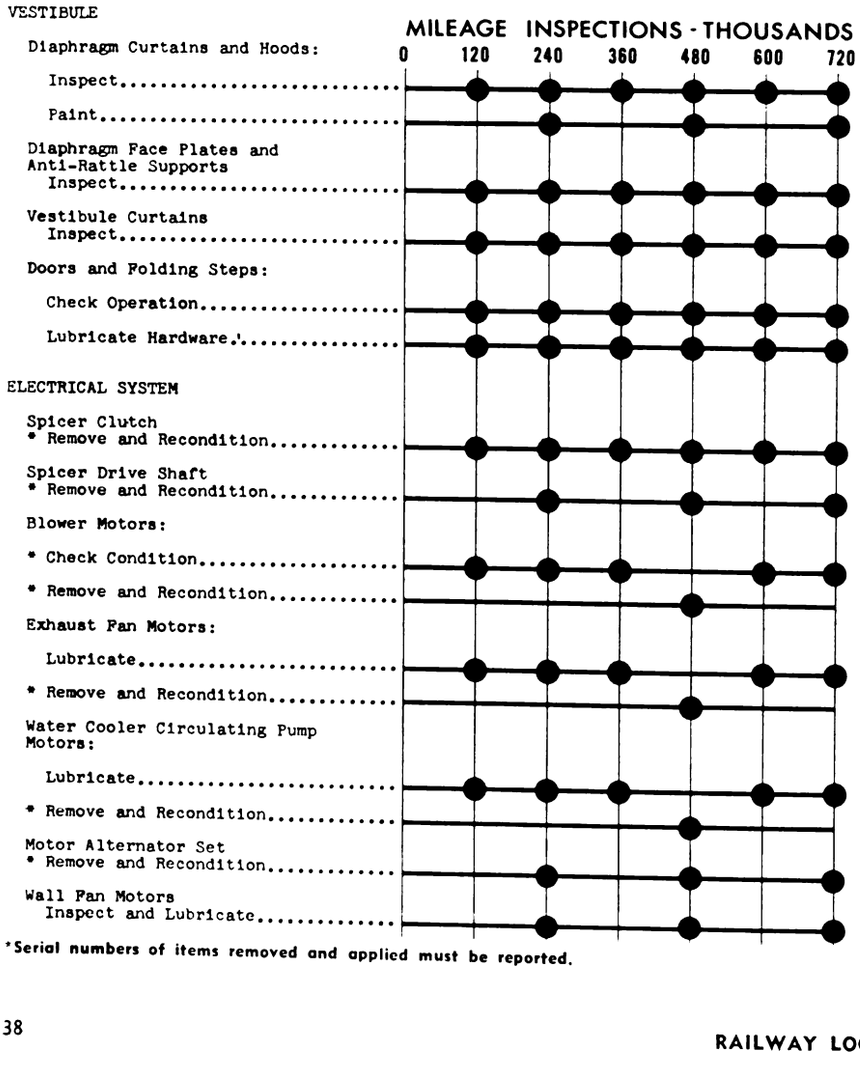
Mileage repair record (top) and passenger car mileage record (bottom) control scheduled maintenance program.

program was decided upon, and before the cars were delivered, it was necessary to fix the locations where all of the work on this new fleet would be carried on. This involved not only planning for preventive maintenance, but making arrangements for all other repairs and for all inside and outside cleaning.

In the coach yard at Glen Yards in Montreal there were already facilities for the preventive maintenance work anticipated for the new cars. Toronto had a comparable set-up. At the time the "Canadians" were delivered, Vancouver had the only mechanical car washer on the system. Vancouver has something else—a mild climate which allows the washer to be used 10 months of the year. The CPR has found it useless to attempt to run cars through mechanical washers when the temperature is below 28 deg F.

CPR Maintenance Schedule

(*Continued from preceding page*)



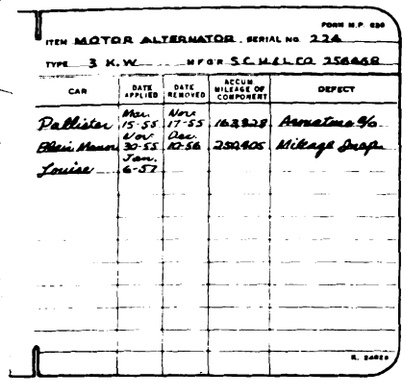
*Serial numbers of items removed and applied must be reported.

All three terminals have long pits for undercar inspections. Shop layouts and switching requirements at all of the terminals also entered into the final decision.

The decision was that all of the scheduled mechanical and electrical work on the stainless-steel cars would be assigned to Montreal and Toronto. The major cleaning is assigned to Vancouver. All of these cars operate into either Montreal or Toronto, and more than 90 per cent of them regularly run into Vancouver. The decision, although based primarily on existing installations and operating procedures, did, however, require extensions and new facilities at all three terminals.

Vancouver got additional brushes on its car washer so that roofs and domes can be cleaned. The coach-yard shop at Montreal was enlarged and 15-ton overhead cranes were put in at both Montreal and Toronto for handling trucks. Store facilities at all three points had to be enlarged and parts stocks had to be established at each. Toronto got a Whiting machine for washing coach sides in 1956 and an installation is considered for Montreal.

The Canadian Pacific attempts to operate its stainless equipment in solid, unbroken consists. However, wheel work and the mileage maintenance program do break the trains up. Vancouver repairs only failures. To do this it is necessary to stock such components as wheel sets, coils, and bearings. Major jobs result in having the car involved sent back through to Montreal for repairs. Toronto sends Angus shops, in Montreal, components which require special testing and rebuilding procedures. These components include water coolers, batteries, gene-



ITEM MOTOR ALTERNATOR SERIAL NO. 224

TYPE 3 K.W. MFGR S.C.M. & L. CO. 258468

CAR	DATE APPLIED	DATE REMOVED	ACCUM. MILEAGE OF COMPONENT	DEFECT
Pallister	Mar. 15-55	Nov. 17-55	162828	Armature Gr.
Ellis Mem.	Dec. 30-55	Jan. 10-56	250405	Mileage Drop
Louise	6-57			

Component removal, failure and overhaul record is method selected by CPR for keeping accurate history of each important component. From these come data for altering scheduled maintenance.

motors, generator regulators, and reverse current relays. Intermediate terminals, such as Calgary, Winnipeg and Sudbury, make only emergency repairs to the stainless cars while they are enroute.

Cleaning Procedures

Although cleaning has been the assignment at Vancouver, this does not mean that no cleaning is done at Montreal and Toronto. All three terminals perform approximately the same amount of trip cleaning. This includes washing the exterior car sides, vacuuming and cleaning the interiors, and washing windows. Dome and side windows are washed at all three terminals and en route at Calgary and Ft. William. At Calgary the exterior of the train is washed mechanically. Cleaning of the car roofs is done only at Vancouver because the washing machine is equipped for this.

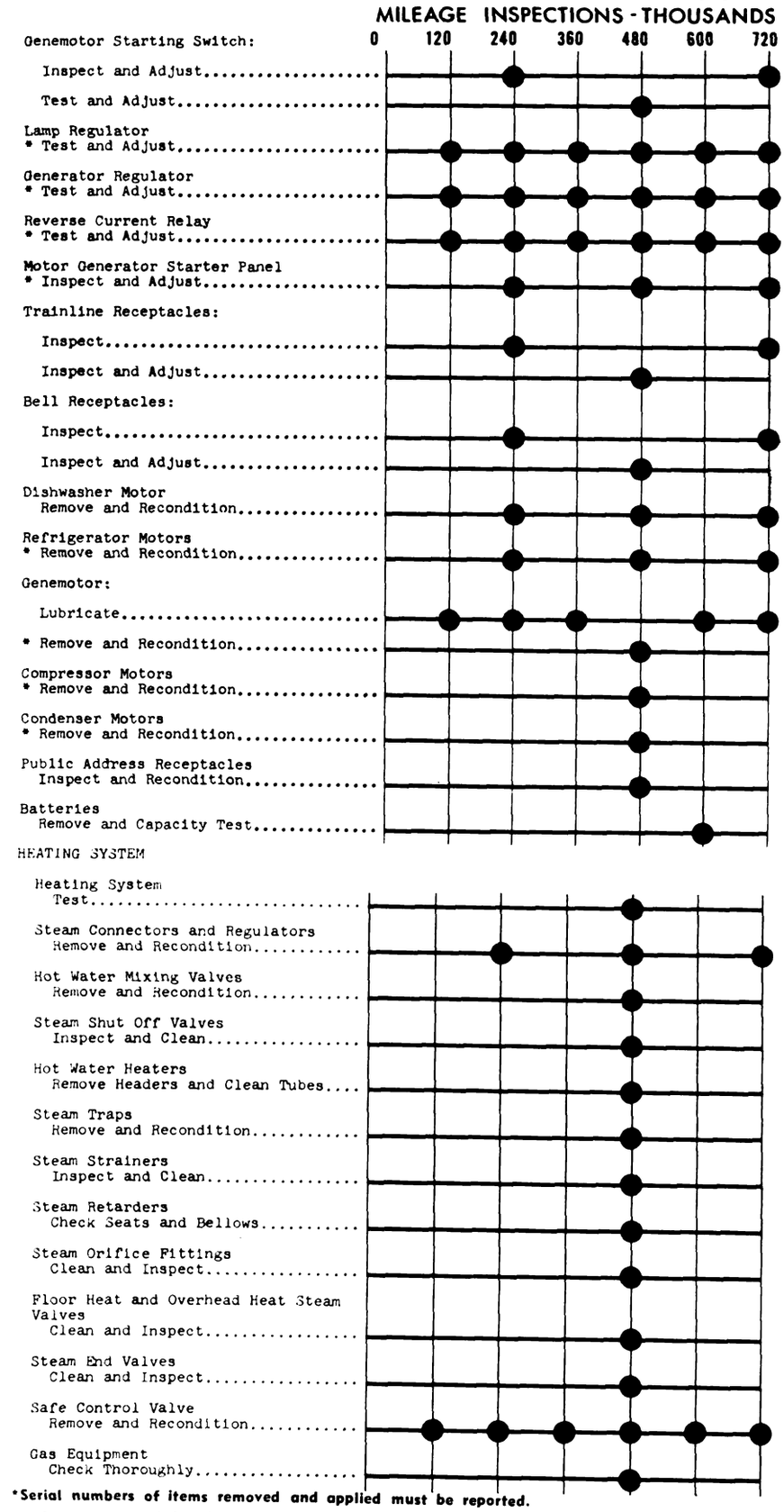
Quarterly cleaning — the most complete type — is performed at Vancouver. This includes shampooing carpets and upholstery, blowing matresses, and washing down the plastic interiors. The upholstery, carpets, berth curtains and other fabrics are all renewed on a condition basis rather than as a part of the mileage maintenance program.

Painting is handled in much the same way. The exterior paint is limited to a tuscan red letter board with gold lettering. This is retouched and repainted as necessary. The bottom of the car and the underbody components are also painted. Since the cars have been in service (over three years), there have been two general underframe paintings.

To facilitate the renewal of worn fabrics or floor covering and the

CPR Maintenance Schedule

(Continued from page 38)



***Serial numbers of items removed and applied must be reported.**

replacement of broken windows or electrical fixtures, the CPR catalogued and diagrammed all of this data for each of its stainless passenger car types. This makes it possible for Vancouver to inform Montreal that a car en route will require a new carpet section, a new piece of upholstery, or new drapes

(Continued on page 51)

Norfolk & Western Finds . . .

Lubricator Pads Do Reduce Hot Boxes

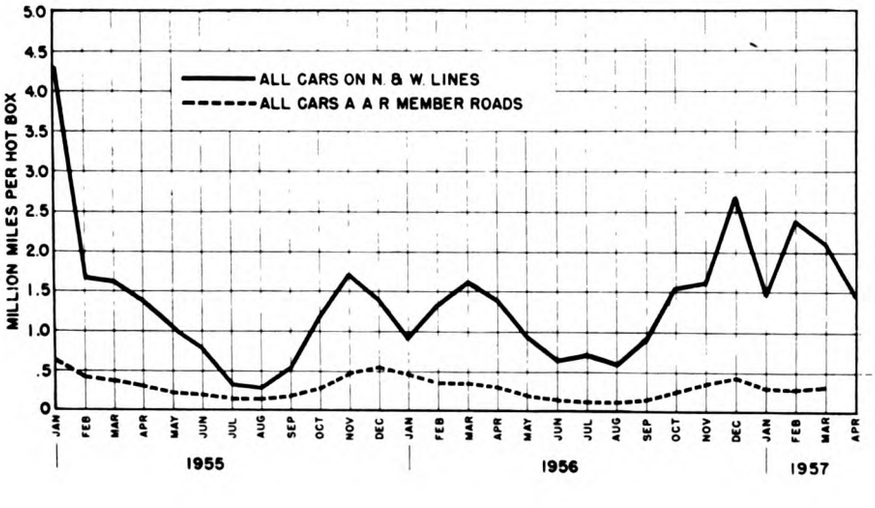
Efforts by member railroads aimed at reducing hot boxes were illustrated for the annual AAR Mechanical Division meeting when Chairman C. E. Pond described the activities of the Norfolk & Western in this field. The N&W's GSMP said that his road's efforts so far have been "fruitful," but that "performance is not what it should be." The road is working diligently to improve it.

Hot box reduction across the years has been accomplished with costly journal box servicing. "If the conventional plain bearing is to continue to be standard for American railroads," Mr. Pond warned, "we must find ways to reduce this servicing cost."

Trial installations of two types of lubricating pads late in 1954 proved so encouraging that early in 1955 the N&W began to apply these devices in large numbers to new and existing cars. They have performed 2.5 times better than cars with conventional waste packing, and have required less servicing. But these lubricators are not "a cure-all for hot boxes," according to Mr. Pond.

"Lubricating pads available today can and should be greatly improved," he asserted. Difficulties include the inability of some designs to wick AAR car oil in sufficient quantities during cold weather, and a reduction in their general wicking ability as they grow older and become contaminated with dirt. Currently, oil companies are working to develop a car oil which will wick better in winter months and at the same time have the lubricating quality and load-carrying characteristics

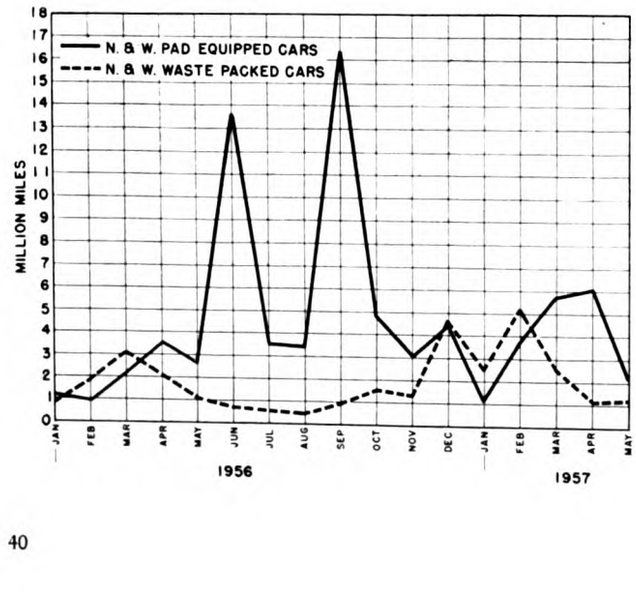
N&W Is Better Than Average; Still Is Not Satisfied

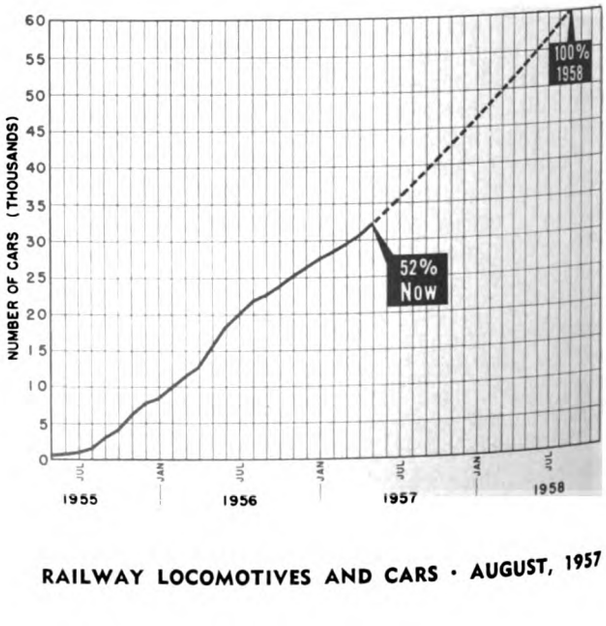


LEFT—The N&W hot box record is better than the average for all railroads. "While some of our efforts have been fruitful," said Mr. Pond, "our performance is not what it should be . . . and we are working to improve it.

LOWER LEFT—Pad-equipped cars averaged 3,000,000 miles per hot box; waste-packed cars 1,250,000 cars in 17-month period. In the winter, waste-packed car mileage per hot box topped pad cars in some months; was behind in summer.

BELOW—Starting in the fall of 1954, N&W has steadily increased the number of lubricator pads on its freight cars. Nine types of pads are in use on the 32,000 cars equipped. All N&W freight cars should have them by the fall of 1958.





of present oils. In dumping cars the N&W has had difficulty with loss of oil from boxes (see illus.).

At present this road is fitting up five hundred 70-ton hoppers with controlled-clearance bearings, lubricator pads, journal stops and 50-in. radius wedges. The stops will position the axle so that an effective dust guard seal can be used, and a seal for the front of the box will also be utilized. Decreasing the wedge radius is expected to give better load distribution on the journal.

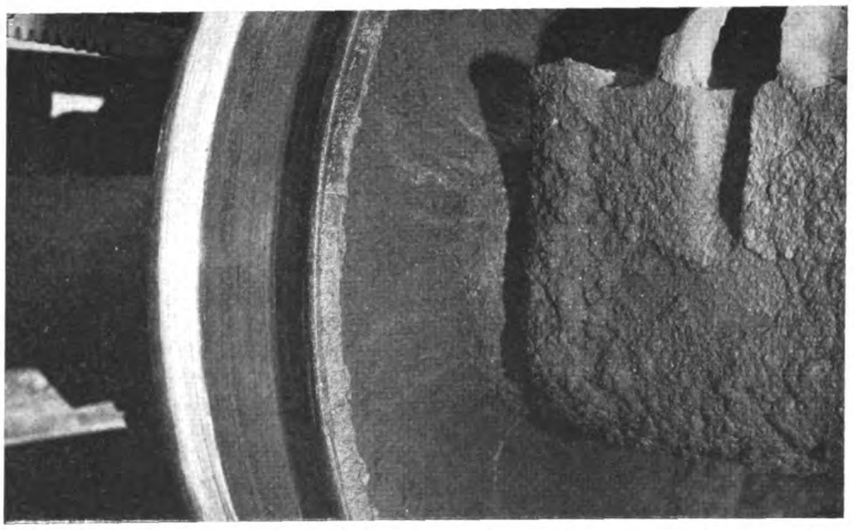
Better Seals

"Another development . . . greatly needed, and one which will pay rich dividends, is a good seal at the back of the box at the dust guard opening," according to the Mechanical Division chairman. He went on to report that to retain oil in boxes, particularly on pad-equipped cars on rotary dumpers, an improved seal must be found for the front of the journal box too.

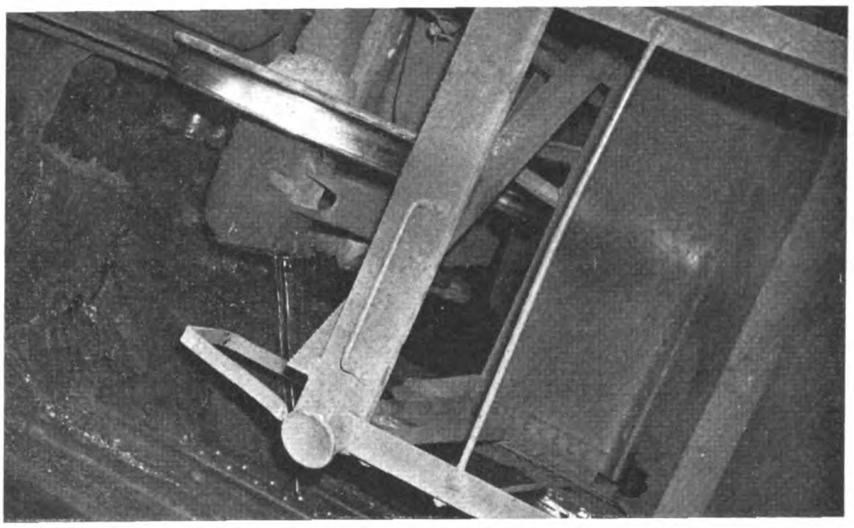
"Until that time when hot boxes can be reduced to the lowest possible minimum," warned Mr. Pond, "the use of some type of hot box detection device that is accurate and reliable will be of great value to the railroads." He went on to describe the installation and operation of one such device at the entrance to one of the important N&W yards.

Devices of this type (Railway Locomotives and Cars, June 1957, p 48) employ infrared pyrometers which electronically actuate chart recorders that can be located up to four miles from the detectors. "The device is reliable and extremely sensitive. So far its performance has been satisfactory with a few minor adjustments," according to the AAR Mechanical Division chairman.

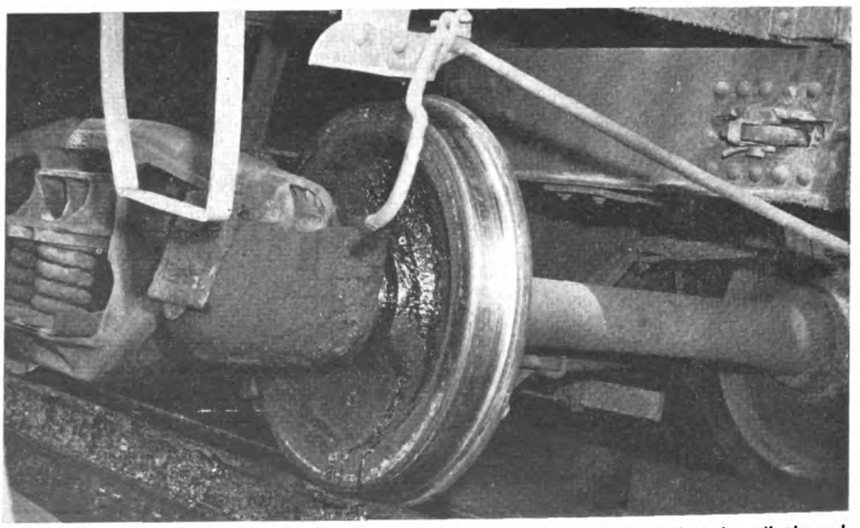
Improvements in seals and lubricating arrangements are all parts of but one problem which confronts railroads in their struggle to receive a share of future traffic. "Progress and research go hand-in-hand," concluded Mr. Pond. "The progress we will make tomorrow largely depends upon research we are doing today. This should point the way to higher standards of service, improved methods and procedures, and better designed rolling stock. If we pursue such a course, the future of the railroads will be bright and encouraging."



Oil film 2-in. wide on tread of car wheel came past dust guard and was thrown across plate to the tread during normal operation. It spreads to the rail and complicates train handling particularly on heavy grades.



On rotary car dumper the inability of the lid to retain oil in the box of this hopper car is a factor in increasing N&W car oil consumption. Mr. Pond pointed out that this is a problem for roads handling ore and coal.



Journal box on the opposite end of same axle of car on rotary dumper lost its oil through the dust guard opening. The speaker emphasized that the need for better seals was true "particularly on pad-equipped cars."

Research, New Equipment Vital for Tomorrow's RR's

"Changing Federal regulation is not the real answer to this problem of meeting competition, as some leaders in your industry would have the public believe," K. H. Tuggle, ICC commissioner, warned the thirtieth meeting of the AAR mechanical division in Chicago on June 27th. "The real and permanent answer lies right in your own field of research and development. . . . While your mechanical research is clearly on the increase, it must not only continue in that direction, but more importantly, the increase must be paced to keep up with the demands of your industry, your commerce, and your national defense establishment. Meet this demanding overall challenge and you need have no fear as to the future prospects and success of the American railroads."

"Federal regulation," said the ICC spokesman, "can never play more than a subordinate role in the accomplishment of maximum safety in your transportation operations. The best place, in fact the only place for real and lasting accomplishments in carrier safety, is inescapably in your hands." In an address earlier in the week, AAR vice president R. G. May talked about the power brake bill—a legislative proposal which he termed of importance to mechanical officers. He reiterated his earlier statements that it would block progress and changes in operating and maintenance practices and would slow technical development. "The AAR has urged and continues to urge that it be given no further consideration," he concluded.

The mechanical men heard J. W. Barringer, P&LE president, say that "There seldom has been a time when railroads operated to such satisfaction of their owners, their patrons, their employees and managers, not to mention legislative and regulatory bodies, that a so-called 'railroad problem' did not exist. The politicians at one time thought that the problem was that the railroads earned too much money; unhappily that is not today's problem. . . . For reasons of political expediency, railroads are prevented from assuming the corporate and operating status of a mass production industry."

The P&LE president went on to call for collapsing the "umbrella of protection" which the present system of over-regulation holds over railroad competitors. "Powers of rate regulation should be pruned back to those granted by the 1887 Act and the Elkins Amendment of 1903. . . . There are no abuses which could not be controlled by such provisions."

During all of the mechanical division sessions, speakers were almost unanimous in agreeing that research today, and more research and cooperative action tomorrow are keys to the railroad future.

Seven Cost Cutters

A seven-ply cost-cutting, capacity-building job was assigned to railroad mechanical officers by Norfolk & Western President R. H. Smith.

He told the meeting that railroads must prepare for an increasingly bigger transport task by developing:

- Improved journal lubrication;
- Better draft gears and underframes;
- More efficient air brake maintenance;
- Ways to minimize minor repairs;
- Time savings in car upgrading;
- Common design cars for similar uses;
- Better, more dependable locomotive performance.

Anticipating "tremendous" productive growth in the next 20 years, Mr. Smith said "we cannot meet the challenge of an increasing volume of traffic simply by adding to the freightcar pool cars of present design. . . . We must have better cars in 1975. . . . We ought to know within the next few years just what we are going to do to eliminate some of the undesirable features and component parts of present day cars. And if we don't do that promptly and vigorously, we may be too late."

What the shipper wants today, Mr. Smith went on, "is not a pleasant, liberal settlement for a damaged shipment, but prompt, on-time delivery of his shipment in good condition."

Train delays and damage in derailments caused by hot boxes, and damage from other causes, cost railroads much in good will and in defection of customers to other transport modes, Mr. Smith declared.

Improvements in draft gears and correct evaluation with cost analyses of what kind of gears and cushion underframes are needed for different commodities were also recommended by the N&W chief executive.

"Now it does not appear desirable or sensible for individual railroads to attempt to find the answers for all of these questions. It would appear reasonable though that this can be done more thoroughly and more economically by the research laboratory of your division working with individual railroads in securing service performance to supplement laboratory tests.

"And it is of the utmost importance that these problems be solved as quickly as possible in order that the many freight cars which will be built within the next 10 or 15 years may offer more protection to the handling of various commodities."

Turning to car utilization, Mr. Smith said too much time is lost by too frequent shopping for minor repairs, inadequate maintenance of air brake systems, and for upgrading cars.

"Mass transportation," he contended, "doesn't have to be at very high speeds while the car is moving, but the car must be moving a great-

C. E. Pond

W. M. Keller

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AAR Mechanical Division Officers

er part of the time than it is today."

The mechanical department can't control transit or spotting speeds, Mr. Smith conceded. "But it is to a large extent," he contended, "the responsibility of the mechanical departments to reduce delays on the road and to provide the best means for loading and unloading."

Chairman C. E. Pond, N&W, and Vice-Chairman J. L. Robson, GN, will be serving the second years of their two-year terms during 1957-1958, as will five other members of the General Committee. Reelected for new terms at the Chicago meeting were J. F. Ryan, L&N; H. T. Cover, PRR; J. W. Hawthorne, ACL; J. A. Welsch, IC; and S. M. Houston, SP. The division also chose E. Wynne, Chief of Motive Power and Car Equipment, Canadian National, as a member of the General Committee to replace F. A. Benger, CPR, now retired.

Actions of Division Committees are detailed on the following pages.

Future Fuels and Standard Fuel Tests for Locomotives

Future locomotives and future fuels for present locomotives are subjects to which the Committee on Locomotives gives much attention. The Committee statements that substantial savings are being produced on many railroads by using an ASTM 2-D fuel (40 to 45 cetane and sulfur under 0.50 percent) and that these are being achieved without modifications in the engines or increase in maintenance were questioned by P. V. Garin, Southern Pacific, who said that this is a normal fuel on the West Coast. It has been used by Western railroads for years, and in his opinion, should not be called "low grade".

The SP has used fuels with cetanes down to 35. With its dual-fuel system, and with proper lubricants and combustion conditions, it has regularly and successfully burned residual-distillate blend fuels. Currently the SP can obtain a residual-distillate blend which costs only 70 percent as much as a straight-run distillate. In the "economy" fuel field the Committee reported that "a few roads are experimenting with dual-fuel systems, others with a blend of distillate and residual oil, but some trouble is being experienced with engine deposits, lube oil deterioration, corrosion of valves, increased fuel filter changes. . . and it is questionable whether the advantage of lower fuel costs will offset the increased maintenance."

Gas Turbine Fuels

Successful gas turbine operation requires a fuel specification which is quite rigid, Union Pacific experience indicates. The railroad's twenty-five 4,500-hp gas-turbine-electric freight locomotives produced 12.14 per cent of the total UP gross-ton-miles last year, and had operated a total of nearly 9,000,000 locomotive miles by the end of 1956.

The Committee reports that the fuel for these units must be blended and treated to meet the builder's specification. This raises fuel cost, and the Committee went on to report that the operation to date indicates "that with an esimated turbine load factor of 50 percent, the economical limit for cost of turbine fuel is reached when the turbine fuel price reaches 34 percent of the price of diesel fuel. The above fuel data emphasizes the need for a gas turbine which will successfully burn ordinary No. 6 or Bunker C fuel."

The 4,500-hp UP gas turbines have all been equipped with tenders. This has two advantages. The tender insures that the locomotive weight will remain practically constant, and the tender eliminates intermediate fueling stops and permits extending the operating districts without constructing elaborate fueling facilities. The gas turbine power plants and controls have been altered to include (*1*) new design louvered combustion chamber caps and liners (*2*) air-swirl fuel nozzles, (*3*) new design flow divider fuel pump system, (*4*) Hagan exhaust temperature control system, (*5*) heat soak starting cycle modifications.

Experience has changed some original concepts. Because of thermal shock to buckets and because of the long cranking time, it is not practical to shut the turbine down on descending grades or during short periods of standing. The high idle fuel rate of a gas turbine limits it to through serv-

ice. "The gas turbine power plant itself is fairly reliable" the Committee concludes while commenting on control and auxiliary failures.

Coal-Fired Turbines

The Norfolk & Western steam-turbine-electric locomotive is currently being used in pusher service. The Committee reports that "its fuel efficiency is good, but its dependability—like most experimental locomotives—leaves much to be desired." Its problems have been basically design problems, and changes in component designs have been intended to correct the following problems: (*1*) boiler problems caused mainly by cinder cutting, (*2*) difficulties with the boiler feedwater system centered around the main feedwater pump, (*3*) flash-overs of main generator which have led to redesign of the ground relay system. Chairman Einwaechter concluded, "It is not intended to build other locomotives of this type at present."

In referring to the activities of the Locomotive Development Committee's coal-fired gas turbine, the chairman said that "results are encouraging . . . engineering and other work is being progressed between a builder and a Western railroad, and a locomotive should be ready in about two years." Refinements in component design, and changes in gas flow patterns within the turbine are currently under test at Dunkirk.

The coal-fired, exhaust-heated, open-cycle gas turbine at the Gas Dynamics laboratory of McGill University in Montreal had accumulated 1,000 operating hours late last year. There are no plans now to design a locomotive using this power plant. The Baldwin-Lima-Hamilton and D&RGW study of an atomic locomotive under AEC contract continues and is in "the purely theoretical stage." Electro-Motive would release no information on its work with a 2,000-hp free-piston gasifier-and-turbine-electric locomotive.

Foreign Gas Turbines

Activities and operations involving gas-turbine power plants in Europe were summarized by the Committee, and dealt with nine locomotives. Built and operated in road service have been the following:

- 1,000-hp Diesel-Turbine Mechanical-Drive Locomotive, Gota, Sweden
- 1,000-hp Free-Piston-Gasifier and Turbine Mechanical-Drive Locomotive, Renault, France
- 2,200-hp Gas-Turbine-Electric Locomotive, Brown-Boveri and Swiss Locomtive & Machine Works, Switzerland
- 2,500-hp Gas-Turbine-Electric Locomotive, Brown-Boveri and Swiss Locomotive & Machine Works, England
- 3,000-hp Gas-Turbine-Electric Locomotive, Metropolitan Vickers, England

Untested in service, or designed but not built, are the following:

- 1,750-hp Coal-Burning, Exhaust-Heated-Cycle, Gas-Turbine Mechanical-Drive Locomotive, Parsons and North British Locomotive, England.
- 2,400-hp Free-Piston-Gasifier and Turbine-Mechanical-Drive Locomotive, Alan Muntz, England.
- 2,400-hp Free-Piston-Gasifier and Turbine Mechanical Drive Locomotive, Renault, France.
- 2,750-hp Gas-Turbine Mechanical-Drive Locomotive, English Electric, England.

The Committee on Locomotives continues to watch developments in the hydraulic transmission field, both foreign and domestic.

Standard Fuel Tests

Duplication of tests by several railroads all using the same fuel for diesel locomotives should soon be unnecessary when the Committee on Lubricants and Fuel for Diesel Locomotives has its "Test Manual for Locomotive Diesel Engine Lubricating Oil and Fuel Oil" approved as a standard procedure. This 79-page manual is the result of cooperative efforts of the AAR, the Society of Automotive Engineers, and the Coordinating Research Council of the American Petroleum Institute.

The Test Manual outlines standard methods for testing and reporting the results of diesel fuel and lubricating oil tests. Said the report, "This manual represents the views of many member roads derived from experience, and incorporates the best thinking of the petroleum and engine building industries. It is hoped that member roads will use it for their own purposes and thus obviate the necessity of duplicating test efforts of other member roads."

No such procedures have been available previously, and in the words of the Committee, "there has been much duplication of effort and considerable disagreement in the views between railroads, and between railroads and their suppliers of engines, lubricants, and fuels. . .In addition to obtaining results which can be interpreted by all roads and their suppliers, it is further hoped that through general use of this manual sufficient uniform data can be collected to permit the Committee to devise more laboratory procedures to take the place of expensive and time consuming field service tests. A number of laboratory tests are included in the Manual which materially reduce the hazards and the cost of field testing untried lubricants and fuels, but more are needed."

Lubricants and Fuel

The Lubricants and Fuel Committee vouches for the accuracy of the performance obtained and reported by the Southern Pacific with residual-distillate blends in its dual-fuel system locomotives. "However," the Committee states, "there was not uniform Committee opinion relative to the possibility of widespread use of such fuel. Some felt that their use would be confined to those areas where there was availability of such peculiar fuels at attractive prices and where terrain and operating conditions lent themselves to their utilization."

Standard Definitions

Some standardization in definition and practice could come from the continuing work of the Committee on Locomotives in establishing a uniform class system for repairs to diesel locomotives; in the standard method for defining various types of road failures; and in the submission of a recommended letter ballot item for painting piping on locomotives to identify the fluids they carry. Another letter ballot item deals with the minimum requirements for the main reservoir system for new and rebuilt diesel and turbine locomotives.

The Committee reported on the experiences of four railroads in working on the redesign of locomotive air systems to collect moisture and prevent oil carry-over. An EMD spokes-

man told of the water cooled compressor as one solution and stated that this is now standard on the GP-9 locomotives.

The Committee reported on the experiences of three railroads which have made installations of different types of automatic shut-off devices to prevent the waste of diesel oil during filling operations. This loss is what that Committee termed "a costly and undesirable condition." Some of the devices require the removal of the flame arresters from the locomotive fuel intakes and it was the opinion that "flame arresters can be omitted if required." Commercial devices tested include Aeroquip fuel couplings, Koehler aircraft fuel shut-off valves, and Snyder automatic valves and fueling nozzles.

New ICC Safety Appliance Regulations Delayed

The Safety Appliance Committee reported a year ago having a working group cooperating with the ICC Bureau of Safety and Service on a revision of safety appliance regulations. Committee members have had the working group's report for preliminary study pending receipt of new proposals from the Bureau. Since none were received, the subject has been dormant for the past year.

The committee agreed with the recommendation of the Arbitration Committee to revise Note 1 of paragraph (r) (8) of Rule 3 to permit the use of wood instead of metal for dome steps and dome platforms under certain conditions. This revision was the result of a request based on service experience indicating rapid corrosion of metal steps and platforms because of spillage of corrosive commodities which reduced the useful life of metal steps and platforms below that obtained with wooden ones.

During the year, requests were made for approval of two new types of metal running board gratings. The committee recommended approval of the Flowforge grating and inclusion in the Rules of Interchange. The Relgrit grating request is presently under consideration.

Loading Rule Pamphlets Will Not Be Loose-Leaf

Merits of the loose-leaf system for the loading-rule pamphlets are appreciated by the Loading Rules Committee, but despite this, it has been agreed that the pamphlets will be reissued in their present form. However, all of the general rules and tables will be placed in a separate pamphlet, and pamphlets MD-1 and MD-4 will be consolidated, as will pamphlets MD-2 and MD-5.

The Committee continued to point out the importance of properly maintaining freight cars to meet loading requirements. Continued the report, "This situation with respect to clean cars still exists to some extent, and while improvement is being made, a number of cases during 1956 have given much concern."

A member of the Traffic Committee of the American Iron & Steel Institute complimented the Committee on its accomplishments. He went on to comment on the gondola and flat car situations and said that suitable cars of these types are in short supply because they have not been upgraded, not repaired, or not cleaned before being placed for loading.

Poor floors and sides in these cars are reflected in expensive packaging, damage to lading, hazards to steel mill loading crews, and in the necessity to sort cars to match loads. The AISI group urged more mill-type gondolas, and more cars with special loading devices, but urged policing these cars to keep them in their intended services.

Rock Island bulkhead flat car with bulkheads which can be folded down to provide a flush deck (Railway Locomotives & Cars, July 1957, p 43) was praised by a representative of the lumber industry as typical of cars which railroads must provide to meet specialized requirements of shippers. The Special Committee on Forest Products loading devotes all of its activities to the problems of lumber and wood products loading.

Commenting on the activities of the Special Committee on Forest Products Loading, a representative of the lumber industry called for railroads to look forward to providing suitable and specialized equipment for lumber loads. He commented particularly on the bulkhead flat cars and the plug-door box cars. He urged railroad officers to keep these types in mind when ordering new equipment.

Synthetic Air Hose Gasket Under Development

The Committee on Brakes and Brake Equipment is investigating the necessity and cost for testing air hose couplings and nipples per Par. 2 of E-14-1954 and B-70-1955. This calls for gaging and testing reclaimed couplings on a standard testing device. Par. 5 of E-14-1954 requires that the brake pipe hose assembly, including gasket, be tested. Par. 2 of E-14-1954 will be eliminated if the committee does not find sufficient defective couplings to justify additional cost of testing.

AAR Research is now developing a synthetic air hose gasket which will not contract in extremely cold weather, will remain resilient at temperatures as low as minus 40 degrees, and will give normal wear for a three year period. Beaded type coupling gaskets are being subjected to further tests.

A new type single car testing device for passenger cars reported in 1956, which offers a much more restrictive release, is still undergoing tests. Investigation is being made to determine whether an additional gage will be necessary because of more noticeable wear on AB slide valves and slotted ports in slide valve seat, especially in equipment in service for about 25 years. The committee reports that brake pipe and brake cylinder leakage on freight car trains, greatly reduced in the past several years, is now experienced primarily at the angle cock and hose couplings.

In the matter of providing a proper brake beam which would meet Specification 2518 on the basis of 100 psi brake cylinder pressure, the committee feels that the No. 18 beam under most conditions of service will not be stressed to the point where fatigue will result. Consequently, it has been decided for the time being this beam will be considered satisfactory in its present form. The committee recommended the brake beam manufacturers make the pin hole in strut 1¼-in. diameter for a $1\frac{17}{32}$-in. pin. They have also been requested to analyze the strut to make sure the increase in diameter of the pin will not impair the brake beam strength.

The effective date for automatic type slack adjusters applied to freight cars, complying with AAR standard specifications and having certificate of approval has been extended to January 1, 1958.

The committee again advises that on cars in interchange service, cast iron shoes must not be substituted for the Cobra shoe or vice-versa, on account of the great difference in coefficient of adhesion characteristics between the two types.

The committee favors authorizing installation of the single disc freight car brake "X" to 100 cars for experimental tests in interchange, provided the car committee approves.

Interchange Rules Will Be Easier To Use

AMONG THESE WILL BE SOME OF NEXT YEAR'S MAJOR INTERCHANGE RULE REVISIONS:

Partial List of Arbitration Committee Recommendations

RULE	SECTION	ITEM or PARA-GRAPH	DESCRIPTION OF CHANGE *(Recommending Committee in Italics)*
3	j	3	Add "conditionally approved types of types authorized for test application" to lubricator types to be applied to new or rebuilt cars after August 1, 1957. *(Lubrication of Cars and Locomotives)*
3	t	1-d	Complete band on Allied Full-Cushion trucks in interchange after January 1, 1959. *(Car Construction)*
3	t	3-e	Amend instructions on painting new and secondhand truck side frames to prevent contamination of lubricating oil from paint on inside of boxes.
9	—	2, 4, 5, 6, and 8	Modification of indicated items to eliminate the necessity of recording unnecessary information on billing repair cards.
10	Complete Revision		Revision to eliminate unnecessary information on billing repair cars and reduce costs involved in their preparation. This Rule will incorporate those parts of present Rule 98 involving billing.

(TABLE CONTINUED ON NEXT PAGE)

Simplification and elimination of obsolete material in the Interchange Rules are major objectives of a special working committee of the Mechanical Division's Arbitration Committee. This group also has been working since last February at rearranging the code into separate interrelated sections for more convenient reference by groups having specialized interests such as (a) billing offices, (b) yard and interchange inspection forces, and (c) supervisory and write-up men on repair tracks.

This work is the result of action by the AAR Board of Directors to simplify inter-road clerical work. A special group formed in July, 1955, under the chairmanship of H. J. Ward, PRR comptroller, reported that in this field there were "great potentialities for economies."

To date the study has embraced all phases of operations and will be a continuing program until rules are reduced to the most simplified and understandable form, and until the most modern and economical procedures are established for inter-line billing for car repairs. The ultimate

objectives are:

- Segregation of the mechanical from the clerical phases of the code so the mechanical department employee will be able readily to obtain information and instructions governing actual repair operations and to fix the responsibility for making repairs and for unrepaired damage.
- Simplification of the preparation of billing repair cards to expedite pricing in billing offices.
- Reduction of the pricing structure to its simplest possible form to make possible modern machine accounting.

Already the work has produced results which the Arbitration Committee proposes as changes for Rules 9, 10, and 11 (see accompanying table). Rule 9 specifies the information required on billing repair cards to describe material items used for repairs. Unnecessary detail information will be eliminated and the time for recording this can be eliminated and made more productive.

Simplified Billing

At the present for the removal and replacement of wheels, it is required that inspectors measure and record the diameters and lengths of journals, the diameters of wheels seats, and the diameters of the centers of the axles for the wheel sets applied as well as for those removed. This is done at the car immediately before and after the removal. This consumes time for the inspector, delays repairs, and consumes productive man hours of the car repairmen. This information will be eliminated if the proposed changes are made.

Rule 10 would be expanded to embrace all features relating to the use of billing repair cards for reporting causes of removal, responsibility for repairs and establishing and reporting charges and credits for wheels and axles. This will separate the billing items from the mechanical items in Rule 98.

The new Rule 11 will include all guarantees for wheels and axles. Members of the special committee which is working full-time on this assignment are Chairman E. W. Gebhardt, formerly district supervisor of car maintenance, C&NW; J. P. Svetlecic, formerly car foreman, MP; I. H. Mattern, formerly foreman—car inspectors, Reading; and J. B. Matt, formerly special traveling auditor, Southern.

RULE	SECTION	ITEM	DESCRIPTION *(continued)*
11	New Rule		This rule will include all information relative to guarantee of repairs from Rules 81, 98 (b-8), (c-3), (Interpretation 8), and Rule 99.
17	t	—	New section providing for substitution of "conditionally approved" lubricators for each other or for those authorized for limited test applications.
18	c	1-a	Removal of limitation on welding couplers in accord with revision of Rule 23.
22	l	1	Revision and elimination of diagrams because of rapid elimination of freight cars with wood sills in interchange service.
23			Modification to permit use of new developments in welding, to eliminate obsolete material, and to remove unnecessary restrictions.
32	b	12	Modification to permit the owning road to promptly recondition and return to service contaminated cars that can be reconditioned by cleaning.
62			Note pretaining to second-hand air brake hose revised to require that hose must be marked to show inspection has been made. *(Brakes and Brake Equipment)*
63		1, 2	Consolidation and modification to eliminate differences between top and bottom portion wear limits on brake hangers.
66	b	2, 3	New paragraphs to provide for the repacking of cars equipped with journal lubricators when due for periodic attention. *(General and Lubrication of Cars and Locomotives)*
66-A	k		Modification to separate greases approved under 1953 specification from those to be approved under 1956 specifications. *(Specification for Materials)*
69	Complete Revision		To provide for the proper mounting and mating of various kinds of wheels.
82			Captions under Figures 7 and 8-A revised to conform with similar changes in Wheel and Axle Manual. *(Wheels)*
82			Elimination of symbols for various types of wheel defects because this information will no longer be required on billing repair cards.
93		6	New paragraph intended to assist car owners in their accounting for maintenance of mechanical refrigeration units in cars.
101			New table and note added to provide reference pertaining to the status of the various types of journal lubricating devices. *(General and Lubrication of Cars and Locomotives)*
105			Interpretations 2, 3 and 7 modified to provide equitable basis for charge for items which are procurable from only one manufacturer.
107		168	Modification of third note to provide same deduction for cast-steel wheels as for wrot-steel wheels removed when dismounting operation is not performed.

Other changes not detailed involve Rule 17 (1), Rule 17 (Interpretation 4), Rule 60 (c) and (f), Rule 81, Rule 96, Rule 98, Rule 99, and revision of Billing Repair Card (Wheels and Axles).

Lubricators Replacing Loose Waste

The transition from loose waste packing and problems accompanying this change-over have consumed much of the time of the Committee on Lubrication of Cars and Locomotives. It has been recommended that the earlier letter ballot action of member roads to require "approved" types of lubricating devices on new and rebuilt cars after August 1, 1957, be modified to require the use of *"conditionally approved types or types authorized for limited test application."*

On the basis of an evaluation scheme developed by the Committee, four lubricators have been "conditionally approved" and sixteen others have been "approved for test." The Committee pointed out that the conditional approval for four does not mean that there are not others which are equal or superior. It only means that those so far not granted this approval have not been installed in sufficient numbers, or have not been installed long enough to evaluate their performance. The chairman added that, "Shortly there will be others."

H. M. Wood, Pennsylvania, discussed the relative merits of the lubricating devices and pointed out that the lubricator which produced the best performance on the Pennsylvania with 1,800,000 miles per hot box was one of the four "conditional" devices while the PRR's second best performer with 1,500,000 miles was one of 16 approved only for test applications. He went on to say that there "will be lubricators for which test approval will be withdrawn."

The Committee's new rating scheme requires that lubricators produce a hot box record "three times better than is experienced with journal box packing." The record of waste-packed cars at the present hot box rate was calculated to be 315 set-outs per 54,000 car months. The Committee then requires that the lubricating device record would not exceed 105 set-outs in 54,000 car months. Also a minimum of 18 months service must be accumulated with the lubricator before approval can be granted.

During the discussion, the question of "conditionally approved" lubricators which have been completely redesigned within the past 18 months was raised. A. J. Schulte, Chairman, explained that the original designs had fulfilled all the requirements, and the new designs had outperformed the originals in the laboratory and consequently were granted the "conditional" approval.

The Lubrication Committee has issued instructions for handling cars with journal lubricating devices due for periodic lubrication attention under Interchange Rule 66. The instructions require removal, inspection, and placing "in as good condition as is consistent" before reapplication. It was pointed out that railroads and suppliers were successfully cleaning the devices, and the Santa Fe and Northern Pacific activities were cited specifically. During the past year, the following lubricators were granted approval for limited application: Cardwell-Westinghouse Journal Lubricator, Hennessy Lube-Pad, Acme Lubricator, and Spring-Pak Lubricator.

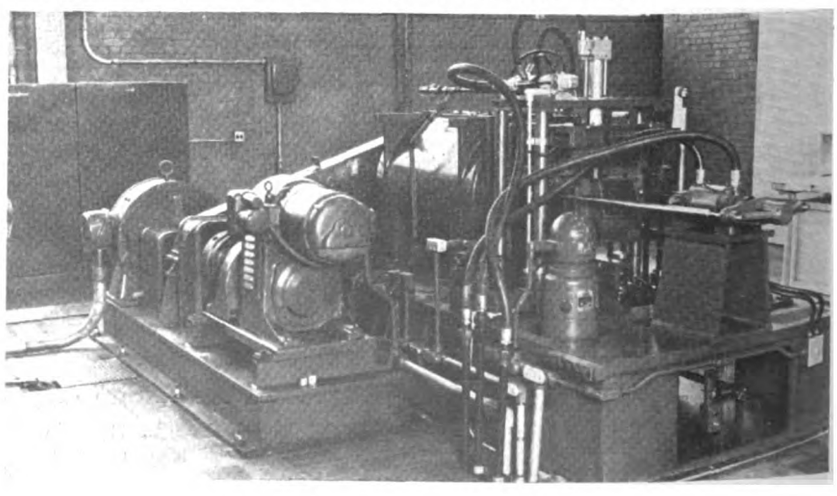
"Manufacturers should reevaluate their lubricators if there is no oil reservoir in the device," H. M. Wood warned. He discussed the oil consumption of the various types and said that the Pennsylvania has started a test with both lubricator-equipped and waste-packed cars to find the proper amount of free oil for each type. "Oilers may put too much oil in lubricators," he observed. The Pennsylvania has an average performance of 639,758 miles per hot box with lubricator cars and 203,019 miles for waste-packed cars. Since about 70 percent of the PRR hot boxes are on foreign cars, it is difficult to correct the situation, according to the Pennsy's assistant chief of motive power. A. J. Schulte completed the Committee presentation by saying that the group is "still not satisfied . . . we want a better lubricator."

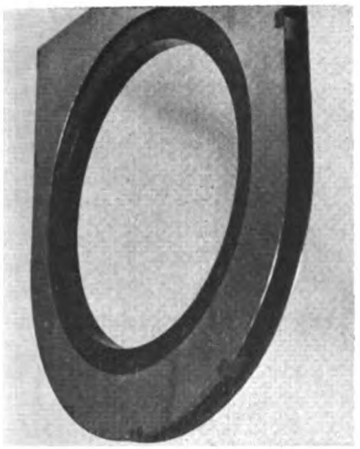
Oil Seals Important

With three years of investigation, and with controlled tests on the Pennsylvania and Great Northern, the Committee has determined that the use of the present wood dust guards produces "no clear cut advantage," and that efforts should be devoted to development of an efficient and reasonably priced rear oil seal. The Committee has granted authority for tests of limited number of the following seals: Empire (1956 report), Guard Seal (developed on the B&O), Turco, and Dust Guard Oil Seal (Hennesy). A seal designed by the AAR laboratory (1956 report) is now being commercially produced and is soon to be installed on Santa Fe and Norfolk & Western cars. Solutions for the loss of oil from lubricators would be both improved dust guards and journal stops according to H. M. Wood, Pennsylvania.

The Lubrication Committee's continued study of test applications of "RS" journal stops was reported to the meeting. Journal bearings and journal stops on a Frisco ballast car have operated for 64 months with the journal stops, journal bearings, and wedges still in "good" condition. One truck of each several test cars was equipped with journal stops and the other retained the standard journal box arrangement. The "standard" end of each car has had bearings with spread linings, and several have had to be replaced, while all brasses operating in conjunction with journal stops could be continued in service. Said the

AAR journal testing machine has worked steadily on lubricator approval





AAR-designed rear seal will be road tested.

Committee, "The mileage on the B-end bearings was quite small as compared to the mileage on the A-end bearings and this indicates the extended bearing life that can be obtained by use of RS Journal Stops . . . Your committee feels that there is much benefit to be derived from the use of RS Journal Stops in prolonging the service life of journal bearings and in helping to prevent hot boxes."

A Pennsylvania spokesman took exception with some claims which have been made for the journal stop. Tests on forty 70-ton hoppers on the PRR produced results which "indicate considerable merit," but are at some variance with Frisco findings. The Pennsy did find less end wear on bearings, 85 percent of the dust guards were undamaged as compared to 15 percent on "standard" cars, and the packing was cleaner. The conclusion drawn by the PRR representative: "A journal stop reasonably priced will help solve the hot box problem." J. F. Ryan, Frisco, commented that his road's experience is with "sufficient cars that it is beyond the test stage." By the end of 1957, the SLSF will have 5,650 cars with stops. Work has been done with journal stops cast in aluminum instead of bronze.

Conventional Bearings

The present standard journal bearing and wedge are being subjected to concentrated investigation. No further work is being done on ventilated journal bearings or with the flat-back bearing. At present, laboratory work is to be continued on an aluminum journal bearing lined with AAR babbit, although work done so far did not justify road tests. First models tested by the research center showed the lug surfaces developing high rates of wear, and also showed the bond between lining and back was not as strong as that of the conventional bearing.

Road tests are continuing on bearings lined with Satco metal instead of babbit. The Committee has authorized the Baltimore & Ohio to equip 100 interchange cars with the "Rymul" design of bearing which is ¼-in. longer than the present standard and has oil grooves on the bearing surface. The design is intended to retain oil now squeezed out under the dust guard seat and under the collar.

The AAR itself is investigating the use of a ¼-in. longer journal bearing. This would be a return to the design standard prior to World War II when the bearing was shortened to conserve critical materials. Said the committee, "The lateral clearance of the [present] bearing on the journal is felt to be undesirably long and the extra lateral clearance permitted by the shorter bearing in addition to the lateral produced by wear of the various parts in the journal box assembly is recognized as an item which should be improved." The longer bearings will be tested with the lugs moved inboard and outboard ⅛-in., and the present shorter bearings will be tested with lugs moved inboard and outboard ⅛ and ¼-in.

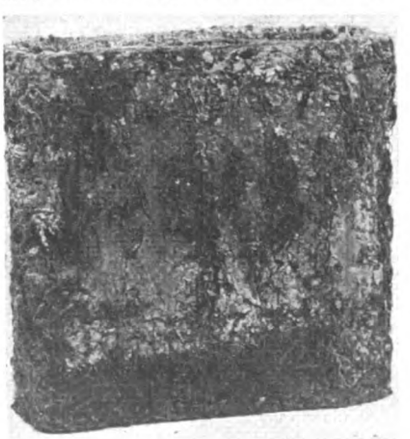
The committee is investigating the crown of the conventional journal box wedge to see if decreasing the crown radius from the standard 78-in. to either 50-in. or 60-in. would produce a better load distribution on the journal's oil film. Cars are already equipped with these bearings and are in service, although no conclusions have yet been drawn from the tests. Along with this investigation, the Committee has decided "that the condemning limit on journal bearing wedges is not severe enough and that many hot boxes occur because of flat wedges which cause concentration of load on one portion of the journal." This has led to a recommendation for a Lubrication Manual change which would reduce by 1-in. the length of permissible flat surface on top of the wedge.

The Committee recommendations on a specification for roller bearing grease were accepted by letter ballot during the past year and tests under this specification are already underway. This is an 8-week simulated road test in a laboratory replacing the road test previously required and found to consume an undue amount of time. During the year the Committee found it necessary to discourage the use of molybdenum disulfide as a journal oil additive because it clogs the fibers of lubricators and packing. Laboratory work on journal oil characteristics at O-deg has led to the preparation of a specification for oil at this temperature which may finally be included in the car oil specification. Work has been done on extending the repack date for waste-packed cars from the present 18 months. In conjunction with this the Committee has recommended that the Wheel and Axle Manual be modified to provide that the end face of the axle be smoothed along with the collar so that it cannot cut up the packing which it contacts. Said the report, "This request is being made because of extensive packing damage being noted due to rough end face and end collars of axles."

Cartridge Bearings

Three different designs of cartridge type journal bearing assemblies have been approved for limited application to cars in interchange service. Shortly the secretary of the division will issue information on the application and design of these units. Member roads were urged to inspect the oil levels in these bearings and were warned that they are similar in appearance to the package roller bearing assemblies. The manufacturers of the three types have been asked to prepare a joint instruction on the re-lubrication periods so that one single period can be applied to all three types. The three types of cartridge bearings approved were the Plain Sleeve Cartridge Bearing Unit of Cleveland Graphite Bronze Co., the Cartridge Bearing Unit of the National Bearing Division of American Brake Shoe, and the Allison Kar-Go Journal Bearing of the Allison Division of General Motors.

Moly disulfide clogs fibers of lubricators.



High Loads Would Get Special Handling

An Interchange Rule revision which would require special handling for any loaded car with a center of gravity over 84-in. has been recommended by the Committee on Car Construction. At the same time it has been recommended that after January 1, 1958, rebuilt and repainted cars have the proper AAR mechanical designation stencilled on the sides of cars "on the same line and directly to the right of capacity markings on car in 3-inch letters." This would be in addition to the owner's own designations which are applied in line with the car's construction date.

Last year member roads agreed to a revision which requires that no part of a car shall be less than 2-3/4-in. above the running rails. This has been amplified this year with a recommendation that the rule be revised to require that cars with multiple-wear wheels worn close to the condemning limits should have new wheels, bearings or wedges installed to maintain this clearance. The aim is to keep clear of retarders and other equipment along tracks, and G. P. McGavock, Norfolk & Western, emphasized that this is both a maintenance and design problem. Work is continuing with the AAR Engineering Division to fix standards for clearance of those portions of cars between the two truck centers (such parts as hopper doors, undercar heaters, and refrigerator car fuel tanks). A revision has been recommended which will require that permanently fire-proofed insulating materials be used in refrigerator cars, and another to permit methyl alcohol refrigerator car heaters to be operated with thermostats set at up to 70-deg.

The Committee has approved the "Schnabel" design of two-piece transformer car (Railway Locomotives and Cars, April, 1957, p 76), and it was announced that this unit is known

Pro's and Con's of Standardizing Piggy-Back Tie Downs

(Summary of Continuing Study by Committee on Car Construction)

• **PROPOSAL:** Cars to be designed for end loading only.
Comment: Plans and designs are being actively progressed to develop cars suitable for side and end loading. Methods of loading should be left open.

• **PROPOSAL:** Height from top of rail to top of deck should be 3-ft 6-in. and should not exceed 3-ft 10-in.
Comment: A car with floor height of 2-ft 5-in. minimum is desirable. Present General Motors and proposed Pullman-Standard cars have floor height of 2-ft 7-in. A minimum height of 3-ft 6-in. would impose restrictions on Eastern railroads handling 12-ft 6-in. trailers through some tunnels.

• **PROPOSAL:** One apron to be provided at each end of car. Minimum width to be 30-in. and aprons to be located at AL and BL corners. Minimum length of apron to be 4-ft.
Comment: Minimum length of 4-ft should not be specified because of use of short cars for long trailers and because of use of two cars coupled with permanent drawbars. Both of these may require shorter aprons for satisfactory operation.

• **PROPOSAL:** Minimum number of tie-downs to be four per trailer. Minimum size of cable ½ or ¾-in. alloy chain made from a special analysis, high-test steel with good resistance to impact loads. Minimum safe working load 16,200 lbs per securement.
Comment: There is no objection to the use of chains, but provisions should be made in this item to cover designs where securement is obtained without the use of chains or cables.

• **PROPOSAL:** End of tie-down cable or chain that attaches to trailer must be equipped with hook or eye.
Comment: There appears to be agreement on this subject.

• **PROPOSAL:** Trailers must be equipped with eight open hooks. Four of these hooks shall be on each end of trailer, not more than 42-in. from the end of trailer.
Comment: Making applications of open hooks on trailers mandatory is not concurred in. Many trailers are now being handled which do not have such attachments. One system is to use a self-locking beam at the fifth wheel with chains attached to the beam. At the rear of the trailer safety chains are passed over trailer underframe members or bumper. It is not desired that railroads and common carriers be burdened by requiring attachments on trailers. Some users say that hooks are not satisfactory and ask for consideration of D rings, eyes, or open links.

• **PROPOSAL:** One standee shall be used at front end of trailer. Standee must be removable or hinged and preferably attached to the car floor. Minimum height above car floor 40-in. and maximum 44-in.
Comment: While no objection is made to the use of a standee or stanchion, consideration must be given to the use of jacks and jacking beams. Reference should be made to a retractable hitch, in which case a minimum height should not be specified.

• **PROPOSAL:** Minimum width of guide rails shall be 8-ft 4-in.
Comment: One large operator of piggy-back service after considerable testing has found that 8-ft 2-in. is the optimum minimum width.

• **PROPOSAL:** No part of the car or attachments between the tires of vehicles shall project more than 8-in. above top of the deck.

• **PROPOSAL:** A clear space 8-in. wide for the full width of car must be provided across the ends of the car.
Comment: Clear space of 8-in. does not conform with present dimension in Loading Rules which specifies 12-in. minimum at hand brake end of the car.

• **PROPOSAL:** Chock blocks must be used and should be movable and adjustable.
Comment: As the design and development of the stanchion at the trailer fifth wheel location is being progressed to the point where it has sufficient capacity to hold the trailer on the car, the use of chocks is not required. In fact, they should not be used because of the built-in shock absorbers which require certain freedom of trailer movement on the car floor to be effective.

• **PROPOSAL:** Tie-downs, where attached to the car, may be stationary or movable.
Comment: There appears to be agreement on this item.

• **PROPOSAL:** Loaded trailers on cars must meet AAR clearances.

• **PROPOSAL:** All trailers must be equipped with a king pin because many railroads are adopting king-pin tie-down devices.

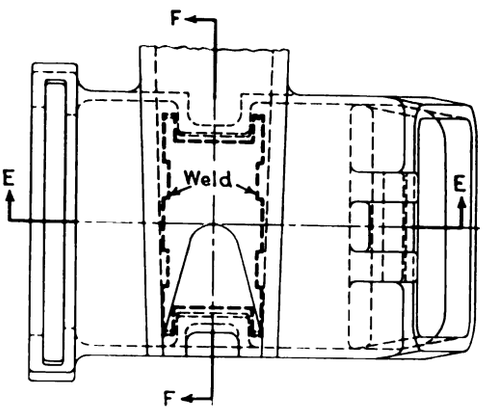
as a transformer transportation car. It was built by Greenville Steel Car and the Pittsburgh Des Moines Steel for Westinghouse Electric and has just gone into service.

Action taken last year by member roads to require the use of 2-3/8-in. lumber for box car flooring has been revised because some roads cannot economically obtain lumber heavier than 2-1/4-in. The previous action also had required three floor stringers on each side of the center sill and the Committee stated that with this support they could recommend the 2-1/4-in. material.

Considerable work has been done on standardizing the tie-down arrangements used for piggy-back service, but there has not been enough agreement to prepare a specification (see table).

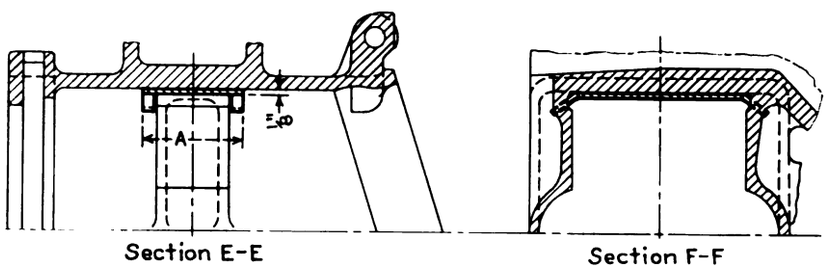
The Committee is establishing the location for retainer valves on flat cars, and has established definitions and designations for cars now to be known as XMC and RBL types. The Standard Truck Manufacturers' Engineering Committee has submitted designs for liners to be applied to the tops of journal boxes of new side frames. The design chosen and submitted for letter ballot action is a ⅛-in. wear plate which is to be forced into contact with the roof of the box and welded in that position.

(AAR Reports Concluded on p 64)



DIMENSION	A
5"x 9"-40 Ton	3⅝"
5½"x 10"-50 Ton	3⅝"
6"x 11"-70 Ton	4½"
6½"x 12"-90 Ton	4½"

Material: Wear Plate, AISI C-1045 Steel, Normalized



Liner for journal box roof would be applied to new side frames.

CPR Keeps 'Canadians' on the Road

(*Continued from page 39*)

at a particular location. The proper color and type of material will be cut and ready for application to the car when it arrives. A similar arrangement is used for replacing broken windows and broken glass in lighting fixtures. Supplied to all points which do any work on the stainless cars are the copies of the three types of data sheets—thermo-sash analysis, electrical fixture analysis, and interior decoration analysis.

Coast-to-Coast Reports

Because maintenance and repairs may be performed at points nearly 2,900 miles apart (Vancouver and Montreal), it is necessary to have standardized reports and procedures to make the preventive maintenance program successful. There are a series of forms detailing each item to be inspected, replaced or overhauled during each of the mileage maintenance periods. There are separate forms for the 120,000-; 240,000-; 360,000-; 480,000-; 600,000- and 720,000-mile inspection periods. These forms are sent out by the office of the chief of motive power and rolling stock. When completed, they are returned by the terminal to show the work has been finished. The items covered on each of these forms is summarized in the accompanying table. This table covers the entire scheduled passenger car preventive maintenance program as it is now operated on the Canadian Pacific. However, schedules can be revised as the accumulated mileages of cars increase.

Terminal reports supplying the information for keeping the Kardex records up-to-date and for posting the wheel record books include "Monthly Wheel Scrapping Record," "Monthly Wheel Removal Record," and "Monthly Component Replacement Report." Further information on road troubles which may indicate necessary changes in maintenance procedure comes from a record of repairs made for failures which did not involve replacement of components. This repair record is submitted not only by the three main terminals, but by all of the intermediate division points which may have had to work on any of these stainless-steel cars.

Manufacturers' and builders' recommendations were combined with the Canadian Pacific's experiences to establish the original preventive maintenance program. Since the cars have been in service, the failures and wear records have led to revisions in the scheduling. Some items operate successfully for periods longer than originally anticipated, and some have had to be inspected more frequently than was expected. Changes in scheduling and information brought out with the complete records kept on this fleet will be discussed in the next installment—"CPR Knows What Today's Equipment Will Do."

As one of the CPR officers recently put it, "The success of the operation has been dependent on the cooperation of the maintenance staff in reporting all the car work with the part serial numbers. This is second only in importance to the accumulation of accurate mileages."

Erie Mining Company's $300 million-plus taconite project, said to be the largest single iron-ore mining venture in history.

AC Brakes Are Being Tested on Taconite Mining Railroad

During July, evaluation tests of Westinghouse Air Brake's AC valve have been underway on Erie Mining Company's 73-mile railroad in northern Minnesota. The AC valve is being tested in conjunction with the pressure maintaining feature of the locomotive brake valve. The cars are equipped with Railroad Friction Product's Cobra composition brake shoes. Among the locations chosen for the tests is a 7.5 mile stretch of 2 percent grade leading down to Lake Superior at Taconite Harbor.

The tests have two purposes: to provide operational data on brake equipment, and to give Erie Mining railroaders some standards by which to operate their new property.

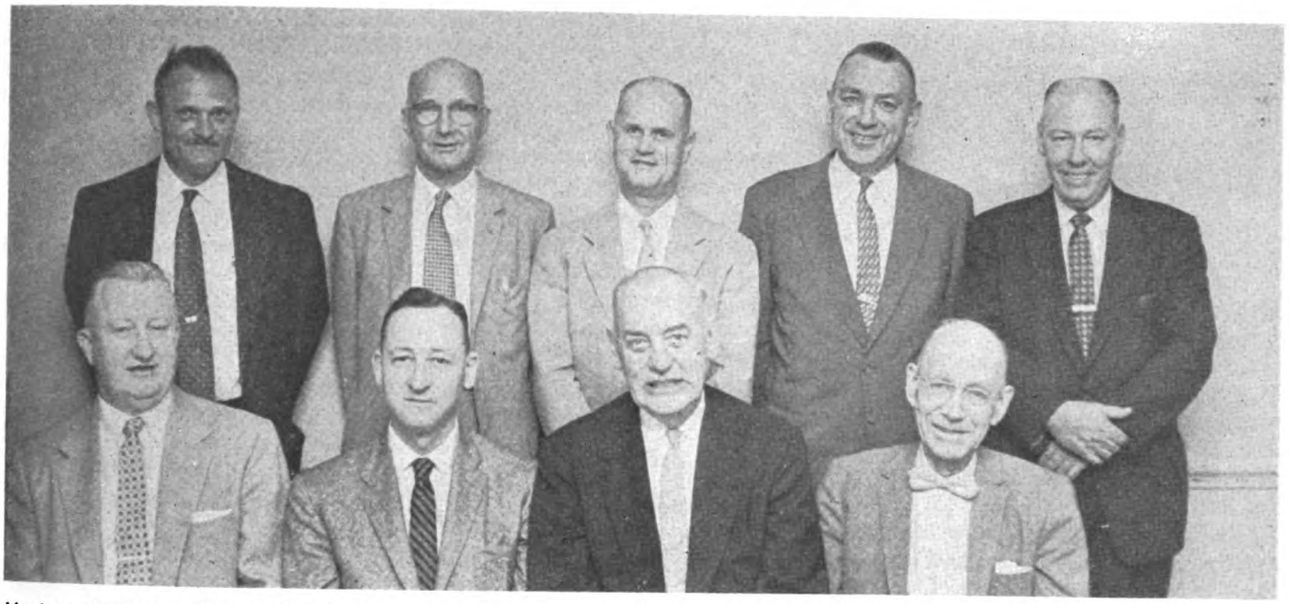
Trial runs will be made with 150-car trains, each powered by five EMD F-9 units. The gross weight of each car will be 251,000 lbs. The AC valve and the pressure maintaining feature does away with the use of retainer valves by making up brake-pipe leakage and permitting a given brake-pipe reduction to be held constant for a considerable period. Westinghouse believes the AC valve allows quicker release of brakes with less sticking and facilitates release at slow train speed. Tests indicate that brakes on rear car of a 150-car train will begin to release nine seconds after the brakes on the first car, as compared with about 50 seconds with the AB valve.

Advantages claimed for the AC valve by Westinghouse are its diaphragm and spool valves which do away with slide valves and ring-packed pistons and are expected to produce savings with lower maintenance requirements. The AC valve's removable portions are about 40 percent lighter. Erie Mining's railroad has the largest installation to date of the AC valve with 500 sets in service. The Great Northern has 50 cars equipped, and the Rock Island's 50 Convert-a-Frate cars are also equipped. ACF Industries is currently installing them on 500 ore cars for the Duluth, Missabe & Iron Range. The AC valve has not been accepted for interchange by the AAR. The Committee on Brakes & Brake Equipment of the Mechanical Division is going to follow the performance of the Great Northern cars.

The Erie Mining railroad runs from a taconite pellet-producing plant at Hoyt Lakes, Minn., 73 miles to a dock at Taconite Harbor on Lake Superior. Operation now is confined to needs of construction facilities. When taconite production gets into full swing, the railroad will haul the plant's total output of 7½ million tons of pellets to docks a year. The pellets will be almost two-thirds iron. Actual full scale operations at the plant are expected to begin this fall after the Great Lakes shipping season closes. The pellets will be stock-piled through the winter and begin moving in 96-car, 12,700 ton trains in the spring. The trains will be unloaded without uncoupling. The bottom-dump hoppers will be dumped into a 1200-ft concrete hopper beneath the track atop the dock. Twenty-five Link Belt conveyors will empty the hopper pockets into the hold of ship.

Present equipment for operation of the railroad consists of 389 pellet cars, 30 diesel locomotives, 5 cabooses, 4 diesel fuel tank cars of 22,000 gallon capacity and 4 or 5 work cars made from old Pullman sleepers.

RAILWAY LOCOMOTIVES AND CARS



Members of the Committee of Direction attending the meeting held on Monday, June 24, 1957. From left to right, they are: (top row) R. I. Fort, IC, D. M. Burckett, B&M, H. P. Wright, B&O, J. L. Christen, Pullman Co., R. F. Dougherty, UP; (bottom row) C. C. Elber, Secretary, Electrical Section, C. R. Bland, C&O, S. B. Pennell, NYC, and K. H. Gordon, PRR. Other members of the Committee are J. J. Schmidt, D&RGW, and P. B. Burley, IC.

Section Holds 8th Co-ordinated Meeting

The work which has been done by the Electrical Section has insured its right to continued freedom of action and usefulness to the railroad industry

IN OPENING THE 1957 MEETING of the Electrical Section, Engineering and Mechanical Divisions, AAR, Chairman Pennell called attention to the rapid growth of the organization. The first joint meeting of the Mechanical and Electrical Sections was held in 1950 at which time both sections voted to consolidate. The consolidation was officially approved in 1951, and became effective January 1, 1952.

This year the section has appointed 33 new committee members, 6 new consulting members and 6 new affiliate members. Attendance at general meetings has greatly increased, and the association shows every sign of healthy growth.

Chairman S. B. Pennell opens 1957 meeting.

C. R. Bland, assistant electrical engineer—rolling stock, C&O, elected Chairman, Electrical Section, 1957-58.

Election of Officers

New officers elected were as follows:

CHAIRMAN: C. R. Bland, assist-

ant electrical engineer — rolling stock, Chesapeake & Ohio.

VICE CHAIRMAN: H. P. Wright, electrical engineer, Baltimore & Ohio.

C. C. Elber, secretary Electrical Section.

COMMITTEE OF DIRECTION: S. V. Smith, assistant electrical engineer, Pennsylvania, and R. H. Russell, electrical engineer, Great Northern. Members of the Committee of Direction who have completed their term of office are R. F. Dougherty, general electrical and air conditioning inspector, Union Pacific, and K. H. Gordon, assistant electrical engineer, Pennsylvania.

In presenting the report of the Committee of Direction, C. R. Bland announced that the 1958 meeting of the Electrical Section would be held in Chicago with exhibits, and the 1959 meeting would be held in Atlantic City, N. J., also with exhibits.

N. D. Howard prophesies bright future for Section.

N. D. Howard, Secretary, Engineering Division, AAR, was asked by the chairman to take the floor. He referred to the fact that there had been some misgivings at the time the two Electrical Sections joined forces. It was feared that they would be dominated and absorbed by the two Divisions. Mr. Howard said he never doubted the success of the single Section and called attention to its continued freedom of action and increasing usefulness. He added that no action has been taken by the Divisions to change, in any way, the status of the Electrical Section.

C. W. Martin tells of progress made in standardizing diagrams.

Wiring Diagrams

The Committee on Wiring Diagrams continues with the slow, meticulous and necessary work of standardizing wiring diagrams and markings for rolling stock. In this report, it is concerned with wire markings for schematic and connection diagrams, and it recommends that the specifications offered in the report be submitted to letter ballot for inclusion in the manual.

Discussion

The report was presented by C. W. Martin (B&O). Discussion was concerned with the advisability of having a communications circuit on cabooses separate from the lighting circuits. As a result an amendment will be sent out to letter ballot which will recommend that a separate circuit, to be designated *CW*, for communications circuits will be added to the caboose wiring diagram.

W. W. Atkinson's committee is responsible for matching the battery to the locomotive.

Automotive and Electric Rolling Stock

In collaboration with Committee No. 1, the Committee on Automotive and Electric Rolling Stock has rewritten Part 5 of the Manual on Control Equipment concerning the auxiliary power system. This deals with storage batteries.

Announcement is made that one of the leading manufacturers of diesel-electric locomotive batteries will furnish new batteries with hinged vent plugs in the near future at no extra cost.

Diagrams in the report show recommended dimensions and contact identification for 27-point control plugs and receptacles for diesel-electric locomotives.

Typical procedures and power testing, sequence testing and automatic transition testing are included in the report for EMD, Alco, Alco-GE and Baldwin-Lima-Hamilton locomotives.

Concerning the mounting height of receptacles, the report makes the following suggestions:

On hood-type locomotives, each end that is equipped for mutiple-unit operation shall have one 27-point control receptacle located as follows:

Top of rail to centerline of receptacle ..... 60 in. min.
76 in. max.

Centerline of locomotive to centerline of receptacle (measured to right of locomotive centerline when facing coupler) ..... 16 in. min.
21 in. max.

Dynamic brake field loop receptacles, if used, shall be located within the same limiting dimensions specified for the control receptacles.

From information gathered by the Committee's railroad and builder's representatives, the following has been established as the recommended location for 27-point control and dynamic brake field loop receptacles at the cab end of car body "A" units:

Top of rail to centerline of receptacle ..... 108 in. min.
120 in. max.

Centerline of locomotive to centerline of receptacle (measured to left of locomotive centerline when facing coupler) ..... 18 in. min.
24 in. max.

The dimensions pertaining to car-body units are given as information only.

Discussion

The report was presented by W. W. Atkinson, (UP). Asked what manufacturer had produced the hinged plug referred to in the report, Mr. Atkinson replied that it was made by the Gould-National Batteries, Inc. and that the opening is a little less than ¾ in. Reference was also made to a device being produced by another manufacturer which would

Chairman S. B. Pennell receives medal from past-Chairman K. H. Gordon.

prevent overfilling of a battery when water is added. It was suggested that tolerances be specified for plug and receptacles pictured in the report and Mr. Atkinson replied that the report intended to include only enough for general specifications and was not intended to restrict the designers too rigidly.

C. R. Wadham tells how to fill fuel tanks without excessive loss of fuel oil.

Motors and Controls

The report of the Committee on Motors and Controls describes a means of mitigating excessive loss of fuel oil when filling diesel locomotives. This was developed by the Illinois Central and installed at 27th Street in Chicago. So as not to disturb the normal fueling of diesels, a separate stand pipe was installed at this location to be used exclusively for fueling the diesel having the special float equipment mounted on it.

A special float was installed in the fuel tank of the diesel. This float has a mercury tube circuit breaker. The circuit from this breaker was brought out to both sides of the locomotive into a Pyle National BRB-12 receptacle. The circuit is closed. When the fuel oil is at the desired level, the circuit is opened.

A solenoid operated valve, 110-volt, 60-cycle, was installed in the supply line on top of the stand pipe. On the stand pipe are also mounted a signal light, service entrance switch, transformer relay, special short circuiting receptacle for the control plug and an idle receptacle to hold the cord plug when not in use. There is also a main shut-off valve at the bottom of the stand pipe.

Discussion

In presenting the report, C. R. Wadham, (IC), said the Illinois Central now has two *A* and two *B* locomotive units, equipped with the fuel transfer control described in the report, and that there are two fueling stations equipped on northbound tracks and two on southbound tracks. He added that it is important to have the tracks level at fueling points, particularly because the control is over one rail, and not on the centerline of the locomotive. Cost of an installation on a locomotive was estimated at $105.00 to $120.00, and of a fueling station at about $200.00.

Repair Shops

On the subject of high potential testing of insulation, a section of the report of the Committee on Repair Shops reads as follows:

Standard a-c high potential tests have long been used and accepted by the industry as proof tests to verify the adequacy of the insulation. This type of test makes no compromise and provides no means of evaluating the condition of the insulation. It is simply a proof test of the insulation at a predetermined voltage level.

Direct-current testing offers a number of inherent advantages, which are particularly useful to maintenance and repair shop testing of diesel-electric motors and generators. First, it may be used to analyze the condition of the winding and to determine corrective action required. Second, it may be used to anticipate imminent failure. Third, it may provide useful information concerning the predicted service life of the windings.

Other advantages of d-c high potential testing are:

1. The test is essentially non-destructive to insulation and permits impressing voltages approaching the breakdown point without damage to the insulation.

2. Repeated tests with d-c potential may be made without damage to the insulation.

3. The test equipment is relatively small, compact, and lightweight and may be transported easily.

P. O. Lautz said "We are trying to determine the condition of equipment without destroying it."

The report then outlines proposed methods of d-c high potential testing and outlines methods of determining what the test results indicate should be done to the apparatus being tested.

In previous reports, the committee has prepared specifications for various types of cleaning agents. In this report they have specifications for four more. These are (1) A hot tank cleaner for aluminum parts; (2) An alkaline steam cleaner; (3) A cold tank cleaner; and (4) a scale removing cleaner.

A chapter of the report deals with ultrasonic cleaning. It describes the remarkable effectiveness of this type of cleaning, but adds that some experiments on committee member's railroad have indicated that, in the present state of development, this equipment is not fully satisfactory for the removal of heavy type soils normally encountered in railroad practice. Since the removed soil remains in suspension, ultrasonic cleaning is best adapted to the final stage of cleaning.

The report is concluded with a bibliograph of selected articles from 1956 periodicals, proceedings and reports on diesel-electric locomotive repair shops.

Discussion

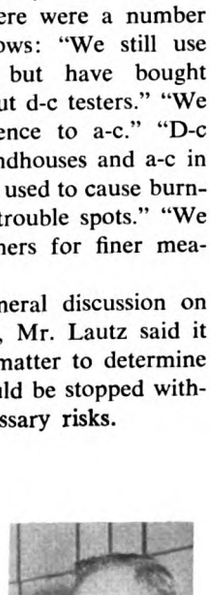
The report of the Committee on Repair Shops was presented by P.O. Lautz, (AT&SF). Asked what equipment was included in the testing procedure outlined in the report, Mr. Lautz said it includes all rewound equpiment, rated 600 volts and that it could include non-rotating equipment. He added that the report was offered as information. "Our primary purpose," he said, "is to find a means of testing which will determine the

condition of equipment without destroying it." "Careful analysis," he said, "is needed."

A. L. Davis, (GE Company) said that GE experience with d-c testing has been quite favorable so far and added that electrical noise at the knee of the voltage curve seems to provide a good warning against overstressing of insulation.

H. P. Wright, (B&O), said that one railroad has been using d-c testing for 10 years. He described the method as an old tool that needs further development. In response to a question concerning how many roads are using d-c testing, there were a number of replies as follows: "We still use a-c in the shops but have bought nothing recently but d-c testers." "We use d-c in preference to a-c." "D-c is used in the roundhouses and a-c in the shops." "A-c is used to cause burnouts and disclose trouble spots." "We are developing others for finer measurements."

Following a general discussion on voltage limitations, Mr. Lautz said it is an engineering matter to determine where voltage should be stopped without taking unnecessary risks.



It was suggested that the welding report presented by M. A. Herzog should be Manual material.

Welding and Cutting

The report of the Committee on Welding and Cutting describes practical methods of reclaiming traction motor suspension bearing dust guards, eddy current clutch housings and the metallizing of the outside diameter of Baldwin - Lima - Hamilton cylinder liners. It also includes a report on coupler and yoke reclamation on a production basis.

A sub-committee consisting of the chairman and three committee members met with a special committee appointed by the AAR to review, revise where necessary, and in general bring Rule 23 of the Interchange rules up to date. It is anticipated that the proposed changes in Rule 23 will enable the railroads to achieve notably larger savings in reclamation work.

Discussion

The Report was presented by M. A. Herzog, (StLSF). In response to a question, he said the cost of reclaiming a coupler was $25.00 as compared with a new cost of $40.00. Larger savings, he said, may be effected if the operation is made larger. P. O. Lautz, (SF) suggested that the report is so complete that it should be considered for inclusion in the Manual.

C. R. Bland outlines the difficulties involved in testing filters.

Air Conditioning And Refrigeration

Methods of procedure have been developed by the Committee for a railroad shop test for thermostats, and a standard form of check-off card has been prepared for inspection of air conditioning apparatus. These are offered for inclusion in the Manual.

The report describes three types of temperature sensing equipment, one employing a magnetic amplifier, a second utilizing an electronic amplifier, and a third which is mechanically operated. It also covers in some detail the heating systems of the New York Central's Train-X, built by Pullman-Standard Car Manufacturing Company, the New Haven's Flying Cloud, built by the Budd Company, the New Haven's Talgo Train, built by ACF Industries and the Pennsylvania's Tubular Train built by the Budd Company. All of these have been described briefly in *Railway Locomotives and Cars.*

The report also describes a reverse-cycle heating and cooling system now being developed by the York Corporation. With this system, cooling is obtained in the summer by the coolant absorbing heat from the car air and rejecting this heat to the Freon in the cooler after which the heat is rejected to the outside air in the condenser. In the winter, the reverse cycle obtains whereby heat from the outside air is brought into the car. With this arrangement, the heat gain is more than twice that obtained from direct electric heat due to the heat of compression plus heat absorbed from the outside air. The use of the two stage compressor with intercooling is also desirable because of its much higher efficiency.

An investigation made to develop a performance specification and standard method for testing viscous impingement type air filters used on passenger cars, resulted in the conclusion that there is little hope of developing a suitable standard method of testing filters until the various interested research teams and manufacturers are able to come to an agreement as to what constitutes proper test dust, methods of feeding dust, type of adhesive, etc.

Concerning the use of permanently lubricated, sealed bearings on air conditioning equipment, the report states that a sealed bearing cannot be substituted for an open bearing in every case. The chief criterion seems to be the ambient temperature of the equipment with added hazards of dust, grit, water and snow. Shelf life of sealed bearings is also another factor. It is felt that cooperation between the bearing specialist, the equipment manufacturer and the railroad will result in the successful application of sealed bearings.

A specification for 10-gal air-cooled electro-mechanical drinking water coolers for stationary structures is offered for insertion in the manual.

Discussion

The report was presented by C. R. Bland, (C&O). Discussion was concerned largely with the fact that the filter manufacturers were unable to agree on methods of testing air filters for locomotives. It was suggested that railroads do their own testing, but agreed that even though they do, specific tests would not cover the needs of all railroads and quite probably even all the requirements of a single road. The quest for effective testing means will be continued.

Asked to differentiate between high- and low-speed compressors, J. L. Christen, Pullman Company, said that those operating at speeds of 750 to 2,200 rpm are considered as high-speed compressors.

Discussion concerning specifications

for water coolers disclosed a difference of opinion. The report includes a specification for a 10-gal cooler. It was pointed out that under high ambient temperatures, the capacity of any cooler is reduced. One group felt that specifications for coolers of other capacities should be included in the report. The other felt that it would be better, for the sake of standardization, to include only one specification and to use more than one unit when necessary.

H. C. Cross lists some potentials of quartz lamp heating.

Electric Heating

The first portion of the report of the Committee on Electric Heating consists of specifications for tubular hairpin type electric heaters for track switches and their installation, and specifications for plate-type electric heaters for track switches and their application.

The Committee also reports on T-3 quartz infrared lamps in railroad service. It states that the T-3 quartz infrared lamp is a gas-filled lamp utilizing a coiled tungsten filament similar to that in a standard infrared lamp. The major difference between a standard infrared lamp and the T-3 is the extremely high energy concentration possible with the T-3. The minimum size and maximum ratings of ordinary glass bulbs are limited by the temperature that glass will stand. The softening point of glass ranges from 840 to 1,000 deg F. The softening point of quartz is 3,000 deg F. It is this property of quartz that makes it possible to enclose a tungsten filament in a tube only ⅜ inch in outside diameter and to operate the lamp at extremely high ambient air temperatures.

Lamps are available in sizes ranging from 500 to 5,000 watts. There are two applications of this lamp already in use on railroads and other industries. One of these is in a copy machine for office use. The tubular quartz lamp in an elliptical reflector in this machine provides a concentrated band of energy directed to the surface of a temperature-sensitive paper. A sheet of this paper is placed over the piece to be copied and both are moved on a belt to the exposure position. Dark areas of the original absorb the radiant energy and conduct it to the chemically-treated paper, which turns dark in the same pattern as the original.

The other application, which has very important uses on railroads, is a portable infrared oven. This oven contains twelve 1,000-watt quartz infrared lamps with 6 switches to control the amount of energy produced. This oven can be used very effectively to heat large pinion gears, bearing races, couplings and other machine parts to be shrink-fitted on to mating shafts.

Other possible applications are drying paint, defrosting the inside of refrigerator cars, heating small remote buildings, and portable radiant heaters to warm workmen in outdoor car repair areas.

Discussion

The report was presented by H. C. Cross, (B&O). A discussion on switch heaters was primarily concerned with difficulties involved in keeping heaters secured to the rail.

One member wished to know if quartz lamps may be used for removing, as well as applying, motor pinions. Discussion indicated that it is possible to use them for removal, as well as application, but that they are not as good as induction heaters for removal because the heating time is longer, and the heat is apt to soak into the shaft.

Power Supply

Due to the constantly increased capacities of utility power networks, railroad customers of power must constantly increase the size and cost of their protective equipment. The cost of indoor enclosures is appreciably lower than that of outdoor installations, and the report of the Committee on Power Supply suggests that indoor equipment be used because of its lower cost and because of easier maintenance.

Concerning recent developments, the report states:

The power packaged transformer units are available in all ranges from 45 through 3,000 kilovolt amperes,—primary voltage 2.4 kilovolts through 14.4 kilovolts; secondary 120/208 volts through 600 volts. This unit consists of primary disconnect, transformer, with throat connection, and in most cases, with secondary air breaker or breakers as needed, all in one enclosure. Its primary advantage is its simple and compact unit construction, which speeds installation and eliminates dirt and foreign matter from the enclosures.

R. C. Welsh, Jr. reports on changing sub-station requirements.

Indoor or outdoor unit substations consist essentially of one or more transformers mechanically and electrically connected and coordinated to perform the best functions for the system.

Low voltage air circuit breakers are now available in draw-out metal enclosures in either indoor or outdoor units. They are rated through 6,000 amperes continuous duty, 240 through 600 volts a-c, 250 volts d-c, and 15,000 through 150,000 amp interrupting capacity.

In a previous article, we had a report on high capacity fuses. One of the manufacturers now incorporates low voltage air breakers and high capacity fuses in one unit and calls it a Current Limiting Circuit Breaker. The breakers are available in 100 to 600-amp frame sizes and continuous current ranges of from 15 to 600 amp.

In recent years there has been an increased interest in self-supporting aerial cables. Self-supporting cables consist of one or more conductors supported by a copperweld in-built messenger and held together by a copper binding tape.

Self-supporting cable is being used as high voltage feeders and secondaries where cost of underground construction is prohibitive and where conditions are not favorable for uninsulated overhead wiring. It is available in all voltages up to 15 kilovolts and in most any design needed for railroad use.

Some advantages of self-supporting cable are:

1. Reasonable cost.
2. Simple to install.
3. Good appearance.
4. Light weight.

5. In-built messenger serves as neutral.

6. Less congestion on poles.

Concerning the recharging of dry cells, such as those used in lantern batteries, the report states:

Although the railroads are volume users of dry cells, it is doubtful that on most railroads sufficient quantity of dry cells could be put under controlled conditions of use to make the recharging of these dry cells economically sound.

Mercury batteries are described as suitable only to applications in which small size is of paramount importance. They produce energy by means of electrochemical action between a zinc anode, mercuric oxide and graphite as a cathode. The electrolyte is potassium hydroxide. The nominal potential is 1.34 volts per cell.

In reply to a question, R. C. Welsh, Jr., (PRR), who presented the report said there is, at present, no satisfactory rechargeable lantern battery. This was confirmed by further discussion. It was also recommended that no further report be made on recharging dry batteries.

C. R. Troop explains why aluminum cables are receiving new consideration.

Wire, Cable and Insulating Materials

The Committee on Wire, Cable and Insulating Materials reports that the temperature limits for butyl insulation have been revised by the cable industry and this type of insulation is now recommended for 90 deg C. copper temperatures for cables rated from 0 to 5,000 volts and 85 deg C. for cables operating above 5,000 volts. This makes possible a reduction in the size of conductors, and a revised table of conductor sizes is given in the report.

General recommendations for the application of pressure-type terminals are given in the report. It is stated that the terminal should always operate as cool or cooler than the wire.

The report states that with insulation which will withstand higher temperatures, it may now be possible to use aluminum conductors in the same size conduit now used for copper. The insulation will, of course, permit smaller size copper conductors.

Discussion

The report was presented by C. R. Troop, (NYC). Asked if there should be specifications for solderless terminals, Mr. Troup said it is almost impossible to describe a method and have the method apply to more than one manufacturer.

Outstanding examples of good railroad lighting are described by G. L. Sealey.

Illumination

A general discussion of illumination requirements of passenger cars, contained in the report of the Committee on Illumination, states beauty is fully as important as utility in designing a lighting system. Pleasing colors with reflection factors of 35 to 50 per cent should be used. Glossy finishes should be avoided. Illumination values of 20 footcandles on the 45-deg reading plane to 5 footcandles on the floors of passageways and vestibules are recommended. Detailed requirements of various types of cars are described.

The importance of cleaning reflectors and reflecting surfaces is emphasized. Due to rising labor costs, the report recommends the practice of group lamp replacement in cars. The usual group replacement time for incandescent lamps is 60 to 80 per cent of rated lamp life.

Deluxe fluorescent lamps are recommended for public areas, including coaches, diners, waiting rooms, lounges restaurants, etc. Standard fluorescent lamps are called the logical choice in service, storage, shop, and office areas to provide maximum efficiency where color values are not too critical.

Announcement is made of a new 200-watt, PAR-56 locomotive headlamp, to replace the existing 200-PAR-56, 30-volt lamp. Benefits expected are an increase of 30 per cent in beam candlepower, improved maintenance of light and simplified installation, since the beam pattern is round, permitting the lamp to be installed in any position.

Reference is made to electroluminescent lighting in which fluorescent material in large sheets forms one side of a condenser and is excited by a-c current. The present maximum efficiency of this type of lighting is 10 per cent, similar to that of moderate-sized incandescent lamps. Brightness of the source can be as high as 2,000 footlamberts which is about the same as a cool white fluorescent lamp.

The latter part of the report consists of illustrated descriptions of station, yard and platform lighting.

Discussion

The report was presented by G. L. Sealey (Reading). All of the report concerning rolling stock and fixed properties listed under Assignment No. 1 for revision of the Manual was okayed for letter ballot. There was considerable discussion concerning lamps for locomotive and passenger car lighting. The remainder of the report was accepted as information.

Car Electrical Equipment

The Committee on Car Electrical Equipment had 22 assignments. Reports on these assignments which have to do with new developments and factors of immediate concern to railroad operation is the question of standard voltages for the various circuits on the new lightweight trains. Primary power supply is well established at 440 volts a-c but there is little agreement on other circuits. The committee recommends 110 a-c for all general lighting and for communication systems and control circuits. A voltage of 12 d-c is suggested for emergency lighting and marker lights and 12 d-c for call bells and annunciators. Three-phase 440-volts is recommended for heating and for motors of ½ hp and above. For kitchen apparatus, the committee recommends 110 or 220 a-c.

Concerning high-potential tests on car wiring, the report recommends RMS values of 60-cycle a-c, of 1,000 volts for 32- and 64-volt circuits; 1,200 volts for 110-volt circuits; 1,500 volts for 220-volt circuits, and 2,000 volts for 440-volt circuits.

T. G. Isel reported on needs of voltage standardization for light-weight trains.

P. B. Burley describes a new electronic tube tester.

The Electrification Committee, represented by L. B. Curtis, is doing spade work for future electrification.

Two new developments in caboose generator drive are described. One, of which 11 are in service on Milwaukee cabooses, consists of a conventional Spicer caboose drive having a 3.70 to 1 ratio. The other is a combined Spicer and Sunstrand hydraulic drive. This includes a hydraulic pump, directional fluid valve, hydraulic pressure regulator, flexible hydraulic transmission lines and hydraulic motor driving an a-c generator.

A new design of permanently attached battery trainline jumper is offered as a means of reducing losses of jumpers and assuring their being available when needed.

In a comparison of lead-calcium battery grids with lead-antimony grids, the committee reports that the lead-calcium batteries cost from 12 to 15 per cent more than the lead antimony. Tests made on several railroads indicate that the life of the lead-calcium batteries is greater than lead-antimony, that efficiency is higher and that the need for flushing is reduced. This is because there is less local action on the lead-calcium plates.

A transistorized ripple voltmeter has been developed to measure the high frequencies developed in commutation. It is proposed to interpret the amplitude of these currents as an indication of a commutating conditions.

Discussion

The report was presented by T. G. Isel, (Pullman Company). Discussion centered largely upon the testing of automatic clutches. It was said that no satisfactory means had been developed, that those proposed were either too costly or ineffectual. It was felt, however, that further efforts should be made to find suitable means of testing because the railroads have had failures which could not be explained.

Discussion of permanently attached trainline jumpers disclosed that they are manufactured both by Joy Manufacturing Company and the Pyle-National Company.

Radio and Communication

The first part of the Report on the Application of Radio and Communication Systems to Rolling Stock is concerned with Manual revisions. Also included and recommended for submission to letter ballot for inclusion in the Manual is a specification for a tube tester. It is for such testing as involves a determination as to whether the tube is in a condition suitable for use or continued use in radio receivers, carriers, public address amplifiers and similar industrial electronic equipment.

With reference to developments concerning application of television to rolling stock, the report states that this has been limited almost entirely to installations on railroad business cars.

Discussion

The report was presented by P. B. Burley (IC). Assignments 1 and 2, concerning Manual changes and cooperation with the Communications Section were okayed for letter ballot for inclusion in the Manual. Assignments 4 and 6 dealing respectively with conversion equipment for communication radio power supply and developments on the application of television to rolling stock were accepted as information.

Railway Electrification

The Report on Railway Electrification again emphasizes the opinion now widely held that electrification will again find new application in this country, and that when it does, the overhead contact system will carry 60-cycle, 25-kv., a-c power.

Fibre-glass poles, the report states, have definite potentials because of their high-strength and light weight. Aluminum also is being considered for contact systems because of its relatively low cost, 30 per cent that of copper for the same conductivity. Recent experience with high-speed operation, it is felt, calls for improved catenary design, if speeds are to be increased considerably.

Problems of phase unbalance created in power networks by single-phase electrification have caused engineers some concern, but it is felt that with the greatly increasing sizes of networks that it will not create any insurmountable problems.

Discussion

The report was presented by L. B. Curtis (PRR), and L. W. Birch (Ohio Brass Company). Of particular moment in the discussion was a point made by H. F. Brown (Gibbs & Hill). He called attention to the enormous costs of reorganizing and rearranging of other electrical circuits when railroads have been electrified in the past, and suggested that adequate preliminary planning be made to eliminate expensive alterations in the future. Much of the work, he said, may be accomplished now by designing communication and signal facilities looking forward to the time when electrification may come again.

Suspended cross-track lighting in the Citico Yard of the Southern at Chattanooga, Tenn.

It Was the Maintainer Who Slipped

By Gordon Taylor

A REPORT was made by the crew of an EMD passenger unit that the wheelslip relay was operating more frequently than usual.

Since the track condition was good, the crew reported that they thought it was not a case of actual wheel slippage. It seemed more a case of some wiring trouble, that might cause undesired action of the wheelslip relay.

A test of the relay indicated that it was correctly adjusted. A check of the motor field shunting circuits failed to reveal a condition that might have created an unbalanced condition existing in the traction motors.

The locomotive was permitted to return to service and again the crew complained of action of the wheelslip relay. The maintenance force rechecked the control wiring circuits but found nothing wrong. Some thought was given to the idea that there might be too much difference in the diameter of driving wheels, driven by different motors.

If all wheels were of equal diameter, the current drawn by each motor should be approximately the same. If, however, one pair of wheels should be larger than the others, the motor driving that pair would tend to draw a larger share of current. This might conceivably create an unbalanced condition between motors that would serve to actuate the wheelslip relay.

However a check of wheel diameters revealed no difference of diameters greater than three-quarters of an inch between any two pairs. A difference, not to exceed three-quarters of an inch, is standard practice on the road under discussion.

The diesel unit was returned to service and was again the subject of reports of wheel slip relay trouble.

Finally, the electrical foreman decided to remove the No. 2 traction motor for a thorough clean up, and not because it was suspected of being connected with the wheelslip trouble. A spare motor was installed in place of the No. 2 motor and the diesel unit was returned to service.

This time there was no report of undesired action of the wheel slip relay. The trouble cleared up with the replacement of the No. 2 motor. The problem now boiled down to a question of "what is wrong with the first No. 2 traction motor?" A series of electrical tests failed to reveal any faults with the motor.

There was nothing much left to check, so the electrical foreman decided to count the teeth in the motor drive pinion. To his amazement, he found only 19 teeth, instead of the 20 that he expected to find. This locomotive was geared for a top speed of 85 mph which calls for a gear combination of 57/20.

In some manner, a 19-tooth pinion had got mixed in with a lot of 20-tooth pinions, and had been mounted on the motor shaft without anyone detecting the mistake. Since the pinion had one tooth less than standard, it was small enough that it could be assembled in the truck with a standard driving gear. Had it been a pinion with an extra tooth, the error would have probably been discovered when the motor was installed in the truck.

The faulty pinion had 19 teeth instead of 20, and that meant the armature speed would increase about 1/20 or 5 per cent. That would be equivalent to a 5 per cent difference in driving wheel diameter which, on a 36-in. wheel, would amount to 1.8 in.

Since there was already a difference of about ¾ in. in driving wheel diameters, the difference caused by the small pinion added to the existing difference and created a condition equivalent to a difference of 2.5 in. in driving wheel diameters.

That difference of wheel diameters created the unbalance between traction motor currents that caused the wheel slip relay to report so many cases of wheel slip.

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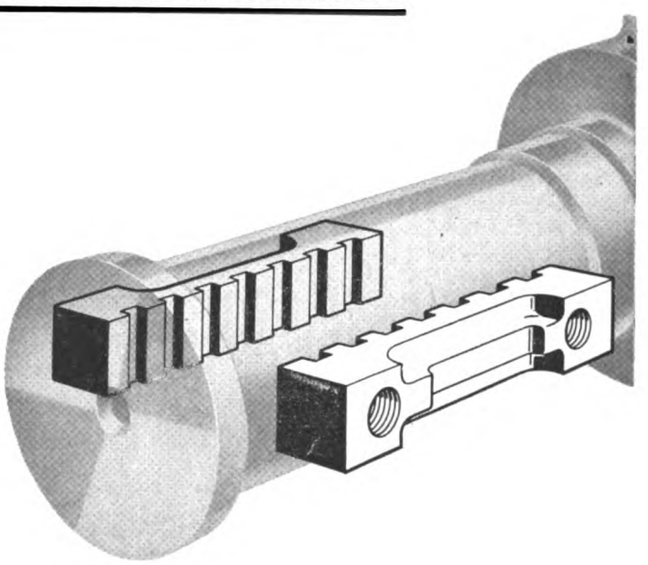

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6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W242-Q—What flow of air then takes place?
A—Distributing valve release pipe air flows to the atmosphere past exhaust valve *134*, passage *19*, cavity *q*, the exhaust port and brake valve exhaust (EX).

W243-Q—Describe the action, if the independent brake valve handle is moved only partially toward Running position.
A—Distributing valve release pipe air pressure in chamber *F* will be reduced pressure and piston spring *148* will move seat *127* into contact with exhaust valve *134* and prevent further flow of air from the distributing valve release pipe.

W244-Q—What happens if the brake valve handle is moved to *Running* position?
A—The handle cam is moved away from the balancing levers and the exhaust valve spring opens the exhaust valve, venting all air pressure from the distributing valve release pipe.

W245-Q—In view of the above, how may the distributing valve release pipe pressure be decreased?
A—In small graduations or exhausted, as desired.

W246-Q—What other air flow ensues with the reduction of distributing valve release pipe pressure?
A—Venting of distributing valve release pipe air permits air to flow from the application cylinder through passage *hl,2*, cavity *k* in the distributing valve slide valve, passage *i,4* and the distributing valve release pipe *4* to exhaust.

W247-Q—What action takes place with the reduction of application cylinder pressure?
A—Brake cylinder pressure on the opposite face of the application piston moves the piston to *release* position. In this position brake cylinder air flows to the atmosphere through ports *c,d*, and *e* and the distributing valve exhaust.
Independent Release, Automatic Brake Applied (Plate 8)

W248-Q—If the brakes have been applied throughout the train by the automatic brake valve, how may the locomotive (only) brakes be released?
A—By depressing the handle of the independent brake valve in its running position.

W249-Q—What movement takes place when the handle is depressed?
A—The actuating plunger *82* and attached plunger collar are moved down to contact and depress the quick release valve operating arm *90*. This moves plunger *93* to the

W250-Q—What air flow then takes place?
A—Air from the application cylinder flows through passages *hl,2*, application cylinder pipe, and passage *2* and *2a* in the brake valve. It continues past the unseated quick release valve *97*, and through the independent brake valve EX opening to the atmosphere.

W251-Q—Explain the flow of air further?
A—Brake cylinder air in chamber *b* moves the application piston *10* from *Lap* to *Release* position, permitting air in brake cylinder pipe to flow through port *c* to chamber *b*, from there to the atmosphere through ports *d* and *e*.

W252-Q—Do these operations change conditions in pressure chamber and brake pipe?
A—No, consequently the equalizing piston does not move until release is made by the automatic brake valve.

W253-Q—What must be done to make a graduated release?
A—To do this the handle is returned to its upper position. This permits spring *83* to move plunger *82* upward away from the operating arm *90*. Anchor pin spring *92* then moves arm *90* away from plunger *93* and spring *98* closing quick release valve *97*.

W254-Q—What is the result of this action?
A—The quick release valve is closed before all application cylinder pressure is lost.

Independent Application After Independent Release, Automatic Brakes Applied

Pamphlet 5046-15 (Page 44)

W255-Q—What is done to re-apply the locomotive brakes after an independent release, train brakes remaining applied?
A—The handle of the independent brake valve is moved to the *application* position.

W256-Q—What action then takes place?
A—The locomotive brake is then re-applied as previously described, except that application air from the independent brake valve chamber *F* through passage *4* and the distributing valve release pipe is cut off from the application cylinder by slide valve *31*, after an automatic application.

W257-Q—What is the air flow from the brake valve control chamber F?
A—Application air flow from the control chamber goes past application check valve *97b*, passage *2*, application cylinder pipe and passage *2* and *hl* in the distributing valve. One branch of passage *2* leads to the application chamber via cavity *n* and passage *w*.

Independent Application After Automatic Application (Plate 9)

W258-Q—If it is desired to increase locomotive braking pressure after an automatic application of less than full service, what must be done?
A—The independent brake valve handle is moved to the *Application* position.

W259-Q—What then happens?
A—This action closes exhaust valve *134* and opens inlet valve *122*, permitting main reservoir air from passage *7* to flow through passage *2* and the application cylinder pipe to the distributing valve application chamber and application cylinder. This air operates the application piston *10* and increases brake cylinder air in the manner described under "Application—First Stage."

K-H-6 Pedestal Brake Valve, Sander Operation (Plate 1)

W260-Q—What does the Sander Valve provide?
A—It provides sanding of the locomotive wheels in forward or reverse operation.

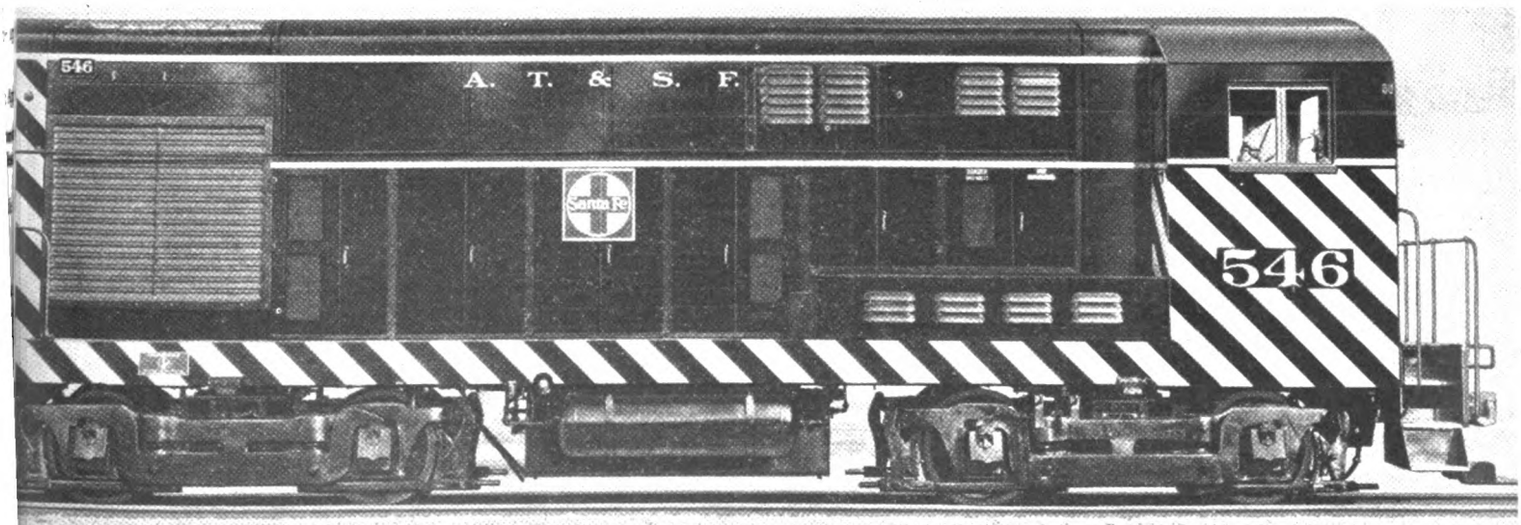
W261-Q—How is sanding provided in reverse operation?
A—By moving the sander valve handle to the extreme left position.

W262-Q—What air flow then follows?
A—Main reservoir air from chamber *B* is connected through a port in the rotary valve *179* to port *11* and the reverse sanding pipe.

ANOTHER REPEAT ORDER

Santa Fe brings fleet of Fairbanks-Morse switchers to 77,000 horsepower

...LOW-COST WORK HORSE OF EVERY MODERN YARD



nks, Morse & Co.,
Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

COMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT

Roller Bearing Ownership Jumps

Ownership of roller bearing freight cars is now well over 37,000, according to F. Fahland, UP, chairman of the Committee on Roller Bearings. This is an increase of over 5,000 cars from figures compiled by the Committee on February 13, 1957, and published in the table at the right.

The Committee's specification for journal roller bearings was approved by letter ballot on March 1, 1957, and the Research Laboratory's recommendations on inspection and test procedures has been accepted by the roller bearing committee. spokesman for the roller bearing manufacturers asked for reconsideration of the laboratory tests called for under this code.

The Committee and manufacturers have agreed on standardization of the following roller bearing components: Cap Screws, Countersunk Pipe Plug, and Locking Plate. E. K. Bloss, B&M, said that he would like to see the specification require that the locking plate be used only once. He went on to state that the B&M has been encountering interference between package roller bearings and truck side frames on some of its recently-completed cars.

The Committee is working on preventing corrosion of roller bearing fillets which may be a source of axle failures due to development of stress corrosion cracks. Manufacturers have been cooperating in developing methods to prevent this corrosion.

Tank Car Repairs

The Tank Car Committee called atention to ICC Special Order 24 effective August 31, 1956. This completely revised Section 78 of ICC regulations covering tank car specifications, and some items of Section 78 aflect the shippers. Since then, the Committee on Tank Cars and the General Committee made revisions in AAR specifications including an alternate steel of fire-box quality for all plates used for tank, expansion dome and the manway nozzles.

Changes in Appendix R require radiographing of any weld seam in an area where deformation is removed. The ICC is expected to make similar requirements effective in its regulations soon.

This Is the Roller Bearing Freight Car Fleet

Railroads	Hop.	Box	Gon.	Flat	Others	Total
Akron, Canton & Youngstown	75	1	1	—	6	83
Apalachicola Northern	—	—	—	—	50	50
Atchison, Topeka & Santa Fe	—	420	—	53	266	739
Atlantic Coast Line	3,584	998	—	103	2,420	7,105
Baltimore and Ohio	55	10	—	—	—	65
Boston and Maine	326	1,499	—	225	—	2,050
Butte, Anaconda & Pac	—	—	—	—	200	200
Canadian National	—	1	—	38	—	39
Central of Georgia	—	—	—	—	1	1
Chesapeake and Ohio	998	500	—	—	100	1,598
Chicago & Eastern Illinois	—	—	—	1	—	1
Chicago & North Western	—	1	—	—	—	1
Chicago, Burlington & Quincy	110	—	—	11	52	173
Chicago Great Western	185	—	—	1	37	223
Chicago, Milwaukee, St. Paul & Pacific	10	5	—	—	113	128
Chicago, Rock Island & Pacific	—	—	—	50	115	165
Clinchfield	—	10	—	—	—	10
Denver & Rio Grande Western	—	—	—	—	1	1
Duluth, Missabe & Iron Range	—	—	—	—	20	20
Erie	—	—	—	50	—	50
Great Northern	440	262	46	2	49	799
Gulf, Mobile & Ohio	—	—	—	1	313	314
Illinois Central	30	—	—	—	—	30
Kansas City Southern	80	—	—	50	—	130
Louisiana and Arkansas	75	—	—	—	—	75
Louisville & Nashville	—	—	—	—	250	250
Mexican Railways	—	1	—	—	—	1
Missouri Pacific	—	1	—	—	—	1
Nevada Northern	—	—	—	—	4	4
New York Central	1	—	—	—	—	1
New York, Chicago & St. Louis	139	12	—	—	—	151
New York, New Haven & Hartford	—	—	—	308	125	433
Northern Pacific	100	—	—	—	350	450
Pennsylvania Railroad	220	3	—	600	—	823
Pittsburgh & W. Va	50	—	—	—	7	57
Reading	150	—	—	—	—	150
St. Louis—San Francisco	400	—	—	—	210	610
St. Louis—Southwestern	—	5	—	—	—	5
Seaboard Air Line	—	—	200	—	300	500
Southern Pacific	—	354	—	161	—	515
Southern Railway	385	425	1	112	250	1,173
Spokane, Portland & Seattle	—	—	—	—	2	2
Toledo, Peoria & Western	—	1	—	—	—	1
Union Pacific	568	9	—	—	1,344	1,921
Wabash	100	—	—	70	—	170
Western Maryland	1,953	—	—	98	—	2,051
Western Pacific	110	1	100	75	35	321
Total	10,144	4,519	348	2,009	6,620	23,640
Private Car Lines						
ACF Industries	—	—	—	9	408	417
American Refrig. Trans.	—	—	—	—	25	25
American Steel Foundries	—	1	—	—	2	3
Burlington Refrig. Express	—	—	—	—	200	200
Columbia-Southern Chemical	—	—	—	—	5	5
Dupont, E. I. de Nemours	—	—	—	—	30	30
Electro-Motive Division	—	—	—	—	2	2
Erie Mining Co.	185	—	—	—	—	185
Ethyl Corporation	—	—	—	—	38	38
Fruit Growers Express	—	—	—	—	1,809	1,809
General Motors Overseas	—	11	—	—	—	11
Greenville Steel Car	—	—	—	1	—	1
International Steel Co.	—	1	—	—	—	1
Merchants Despatch	—	—	—	—	50	50
Petroleos Mexicanos	—	—	—	—	4	4
Pullman-Standard Car Mfg.	—	—	—	1	—	1
Railway Express	—	—	—	—	500	500
Shippers Car Line	—	—	—	—	15	15
U. S. Army	—	—	—	24	180	204
U. S. Navy	—	1	—	—	—	1
Western Fruit Express	—	—	—	—	150	150
Total	185	14	—	35	3,478	3,712
Non-Interchange Cars						
Alaska	—	1	109	50	20	180
Iron Ore Co. of Canada	—	—	—	—	3,025	3,025
Quebec, North Shore & Labrador	—	15	—	—	95	110
Reserve Mining	—	—	—	—	453	453
Weirton Steel	—	—	—	—	8	8
Total	—	16	109	50	3,601	3,776
SUMMARY						
Railroads	10,144	4,519	348	2,009	6,620	23,640
Private Car Lines	185	14	—	35	3,478	3,712
Non-Interchange Cars	—	16	109	50	3,601	3,776
Grand Total	10,329	4,549	457	2,094	13,699	31,128

Compare These Properties

Properties	Armco High Strength Steel	Structural Carbon Steel (Grade B—for Railway Cars)
Yield Strength (psi-min)	50,000	27,000
Tensile Strength	70,000	50-62,000

Get more payload miles per car dollar with Armco High Strength Steel

Cars made of Armco High Strength Steel are misers with maintenance dollars. Parts stay in service longer because they are stronger and more resistant to corrosion.

In the atmosphere, for example, Armco High Strength Steel has several times the corrosion resistance offered by mild steel. And this low-alloy steel is much stronger. Its yield strength is nearly twice that of mild steel; its tensile strength about 20 per cent greater.

But that's not the whole story. Armco High Strength Steel fortifies sides, ends, floors, and structural members against impact, battering, and denting. It holds paint longer than structural carbon steel. In addition, it is readily fabricated into car parts and can be welded by standard methods.

Permits Bigger Payloads

With Armco High Strength Steel you can use thinner sections, too. And because it is more resistant to atmospheric corrosion, these lighter sections will match the life of thicker mild steel parts. As a result, you can trim deadweight to boost payload capacity *without sacrificing service life.*

Let us give you or your car builder full information about low-cost, low-alloy Armco High Strength Steel. Just fill in and mail the coupon, or contact the Armco Sales Office near you.

ARMCO STEEL CORPORATION
1857 Curtis Street, Middletown, Ohio
Send me complete data on Armco High Strength Steel.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

ARMCO STEEL CORPORATION
1857 CURTIS STREET, MIDDLETOWN, OHIO
SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

EQUIPMENT

(*Continued from page 6*)

enclosures for easy mounting adjacent to the motor. It can be supplied with an electrical lock as optional equipment which is released only when the operator presses the starter button. Magnetic starters are supplied as optional equipment if needed. *Selenibrake Division, American Rectifier Corporation, Dept. RLC, 95 Lafayette st., New York 13.*

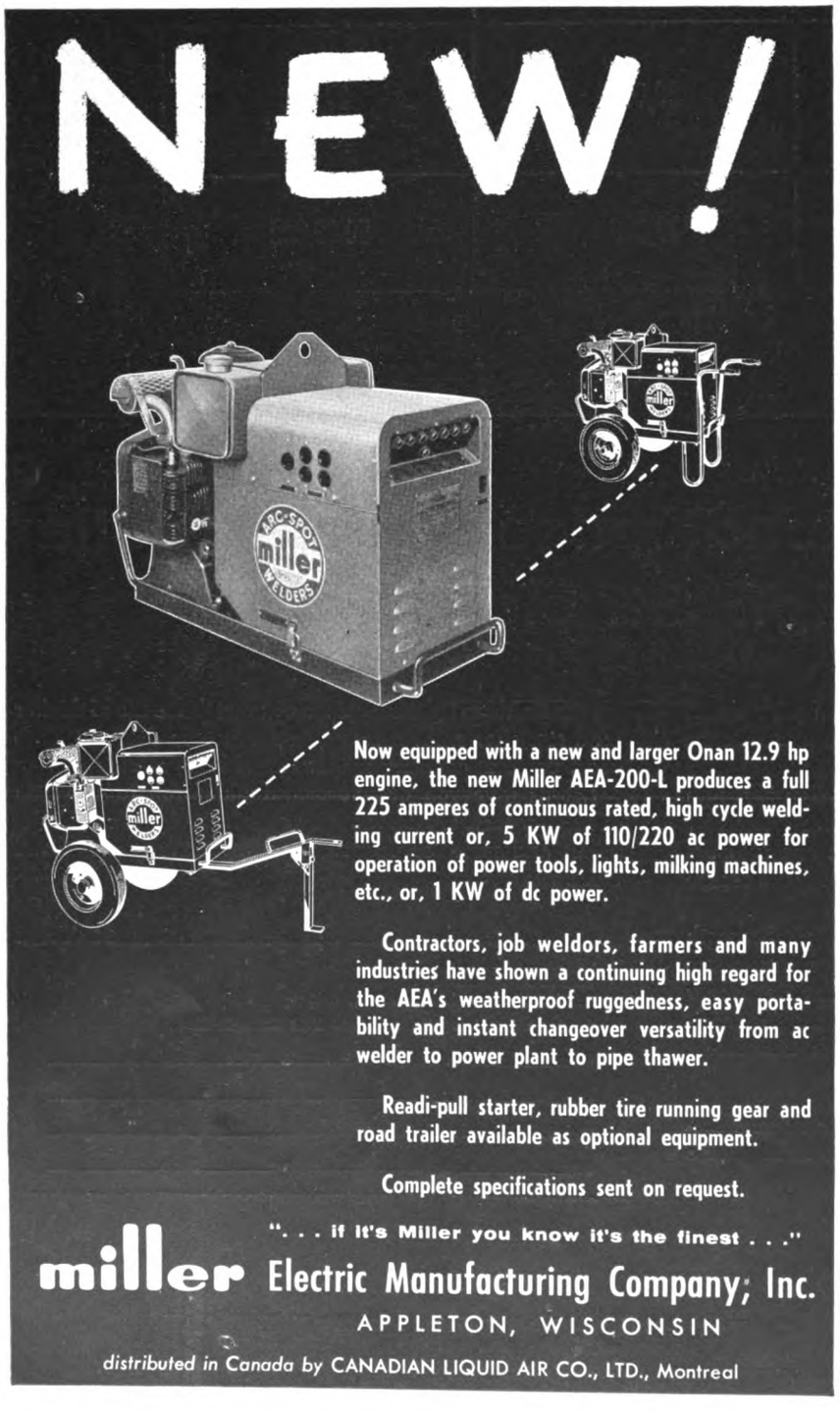
Freight Car Paint

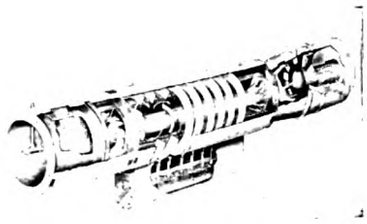
Won-Spray paint can be applied directly to bare, scale-free steel. It was developed as the result of a demand for a coating which would reduce hold-time for application to a minimum and provide maximum protection when the car is returned to service.

The product can be used in a single spray application directly on a clean metal with a dry film thickness up to 4½ mils. It can be used in a conventional two coat operation, applying the first coat to 1½ mils dry film thickness, followed by a finish coat applied to an approximate dry film weight of 2½ mils.

The paint can be applied with any standard spray equipment, including those units employing heat or superheated steam in place of air. It is designed with balanced flow properties over a wide range of temperature and humidity conditions. According to users, the paint does not creep away from rivet heads or sharp corners.

Many one-coat paints thicken rapidly at low temperatures, thus making it necessary to use hot-spray equipment for application or to add an excessive amount of thinner when used at temperatures below 70° F. However, Won-Spray can be used with cold spray equipment without thinner addition at temperatures as low as 50 deg F. The finish is available in all freight-car color standards, including jet black, and in a variety of modern color designs, including bright colors and light tints. *Railway Finishes, National Lead Company, Dept. RLC, 111 Broadway, New York 6.*

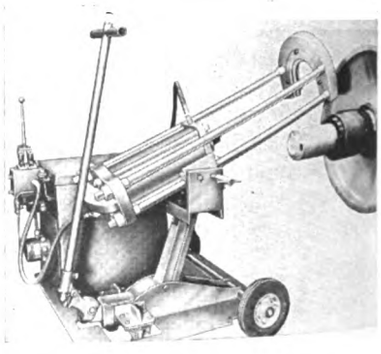




Miniature Dust-Collector

The Microdyne, a cylindrically shaped wet type dust-collector, is said to be 1/20 to 1/10 the size of any comparable unit and capable of collecting over 99 per cent of dust-particles 5 microns and larger in size. The unit represents an unusual application of certain aspects of wet inertial type collection and is available in a standard line ranging from 2500 to 64,000 cfm.

The unit's size allows installation as part of the duct. It can be supplied in stainless steel. *Joy Manufacturing Company, Dept. RLC, Oliver Building, Pittsburgh 22.*



Axle Journal Bearing Remover and Installer

The Model OTC Y4400-A railroad axle bearing pulling and installing machine

(*Continued on page 71*)

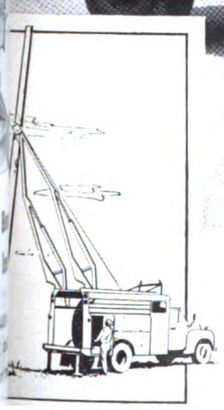
SHELBY SEAMLESS TUBING helps "Pole-Master"* handle poles like matchsticks

THE POWERFUL, two-legged boom of this "Pole-Master" Hydraulic Derrick is made of cold drawn tubes of USS Shelby Seamless Mechanical Tubing. Capable of handling poles up to 75 feet in length with relative ease, the boom is activated by two hydraulic cylinders, also of Shelby Seamless, which are powered by a heavy-duty hydraulic pump. The derrick has an operating arc of more than 180 degrees, and is designed to "set" poles or "pull" them from the ground. The "Pole-Master" can be used under the most severe work conditions in any weather or climate.

Here is an application in which Shelby Seamless Tubing really excels, for it brings into play all the desirable qualities that Shelby Seamless possesses—high strength, uniformity, shock absorbency, dimensional accuracy, lightness and workability.

Produced to exacting standards by the world's largest manufacturer of tubular steel products, Shelby Seamless is available in a wide range of diameters, wall thicknesses, various shapes and steel analyses. You are invited to call on our engineers for assistance. They will be happy to submit recommendations based on a study of your particular requirements.

*Manufacturer's name on request.



WALLS WITHOUT WELDS

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

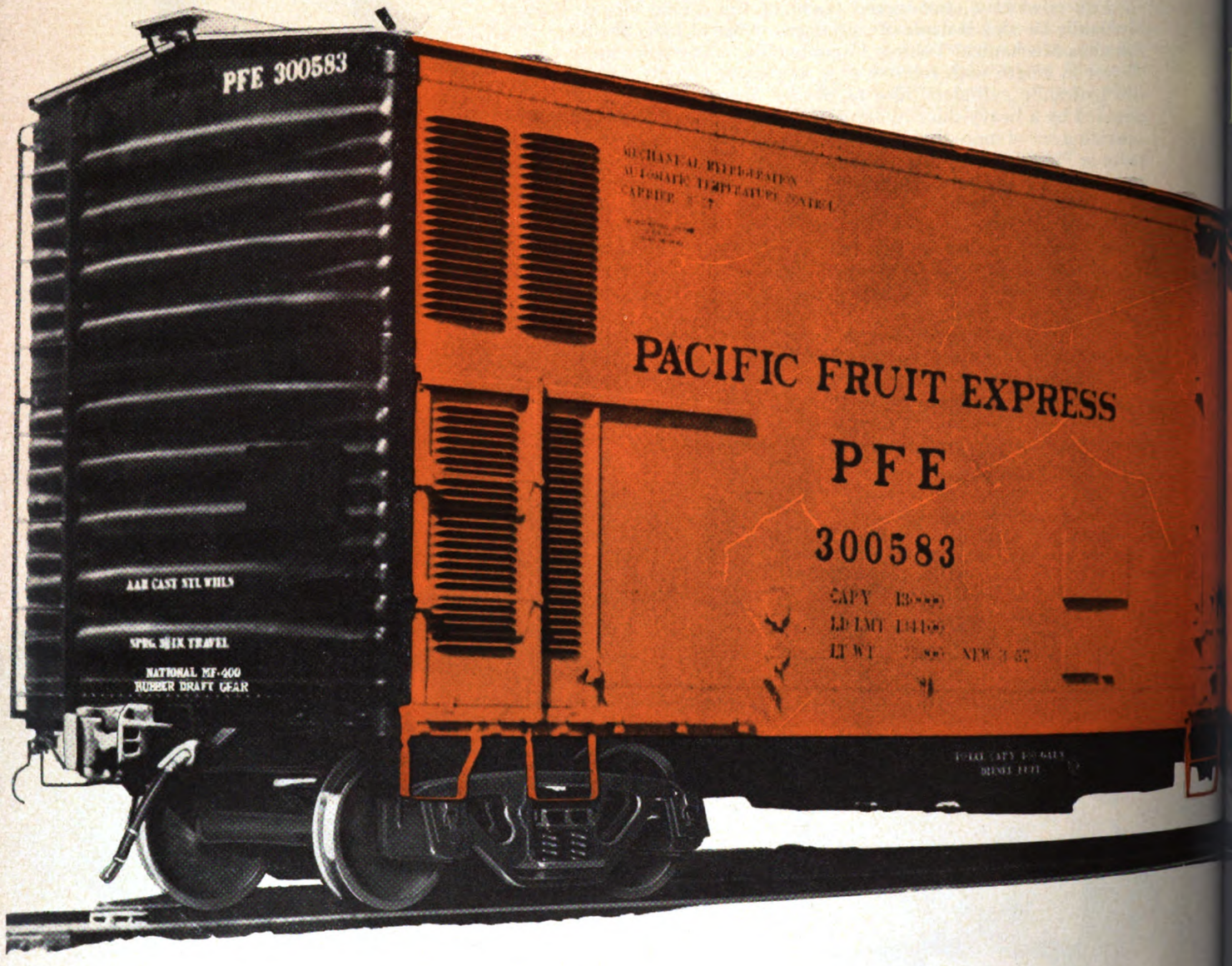
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

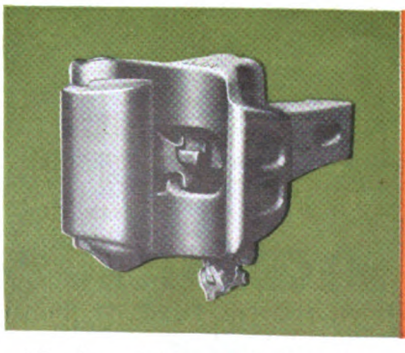
USS

SHELBY SEAMLESS MECHANICAL TUBING

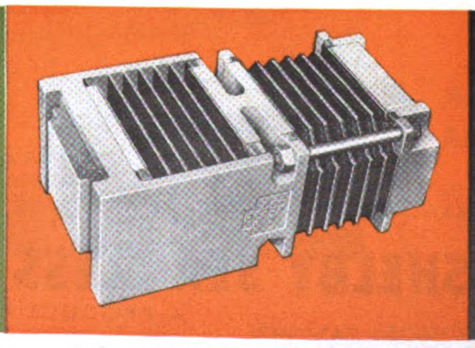
A PRODUCT OF NATIONAL TUBE

There's Improved Railroading with National Specialties





National Type E Couplers

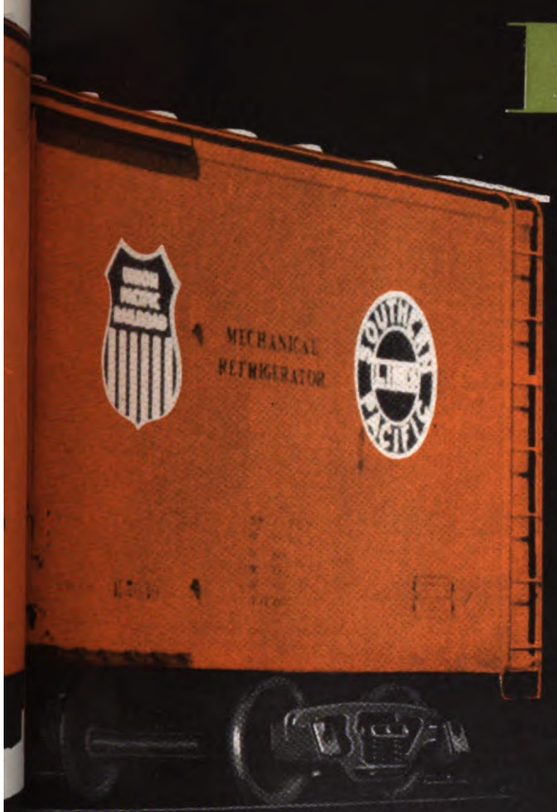


National Type MF-400 Rubber-Cushioned Draft Gears

National Y-40 Yokes

Example:

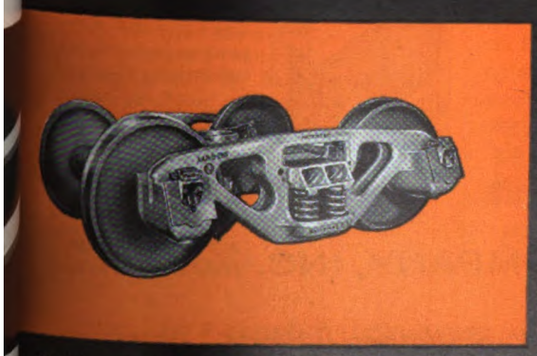
PACIFIC FRUIT EXPRESS



Pacific Fruit Express pursues a continuing program of upgrading its fleet of refrigerator cars. PFE's latest 2,000 car program leaves nothing to chance in protection of valued perishable commodities. 1,800 of these cars are of the latest design equipped with ice bunker and 200 with mechanical refrigeration units for protection of frozen foods . . . and many with National Rubber-Cushioned Draft Gears and National C-1 Trucks to protect PFE's rolling stock investment.

GEARED TO PROGRESS
P R I
MEMBER

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY



National C-1 Trucks

Railway Division Headquarters
Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

Canadian Subsidiary
National Malleable & Steel Castings Company of Canada, Ltd., Toronto 1, Ontario

Established 1868

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES

This radio-equipped caboose is one of the 32 now in service on the Lackawanna. Receiver and transmitter are powered by an alternator-rectifier-battery system.

Instant communication between conductor and engineer or dispatcher speeds freight service — is maintained by reliable nickel-iron-alkaline batteries in radio's power system.

Lackawanna puts Edison nickel-alkaline batteries in 32 radio-equipped cabooses

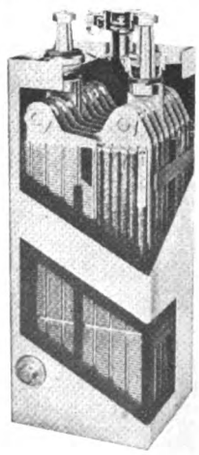
Today, Edison nickel-iron-alkaline batteries ride the high iron in style — in 32 Lackawanna cabooses. Their job: power for two-way radios. And they do it well!

First, they're mechanically *durable*. Nickel-iron-alkaline batteries' steel cell construction withstands the shock and vibration of freight service. The batteries are practically unaffected by heat . . . and they're not subject to injury by freezing.

Second, they're electrically *dependable*. The Lackawanna gets uninterrupted power from Edison nickel-iron-alkaline batteries because they're electrically sound. They're not harmed by occasional overcharging or excessive drain from irregular run conditions.

Greater operating economy, too

Nickel-iron-alkaline batteries have a long average service life. This means lower replacement costs and lower maintenance costs . . . substantial savings year after year.



Take a tip from the Lackawanna. Specify nickel-alkaline batteries for your communication systems, and for signals, car lighting and air-conditioning, and in industrial trucks.

INCO THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

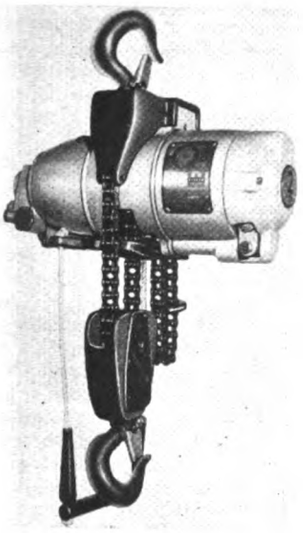
EQUIPMENT

(*Continued from page 66*)

was designed to perform its job without removal of car wheels and destroying the all-important wheel fit. A powerful, double-acting ram provides the power for removing and installation of the bearing assembly. The ram has a capacity of 74 tons for removal and 52 tons for installation. It is mounted in a puller frame which can be raised or lowered hydraulically, to adjust for alignment with the car wheel axle.

The machine is self-contained, with motor, pump, ram, oil reservoir, all electrical as well as hydraulic controls in one unit. The unit is mounted on easy-rolling wheels and can be moved from job site to job and operated by one man. Special adapters are available to service 4-¼ x 8, 5 x 9, 5-½ x 10, 6 x 11 and 6-½ x 12 in. freight car journal bearing assemblies.

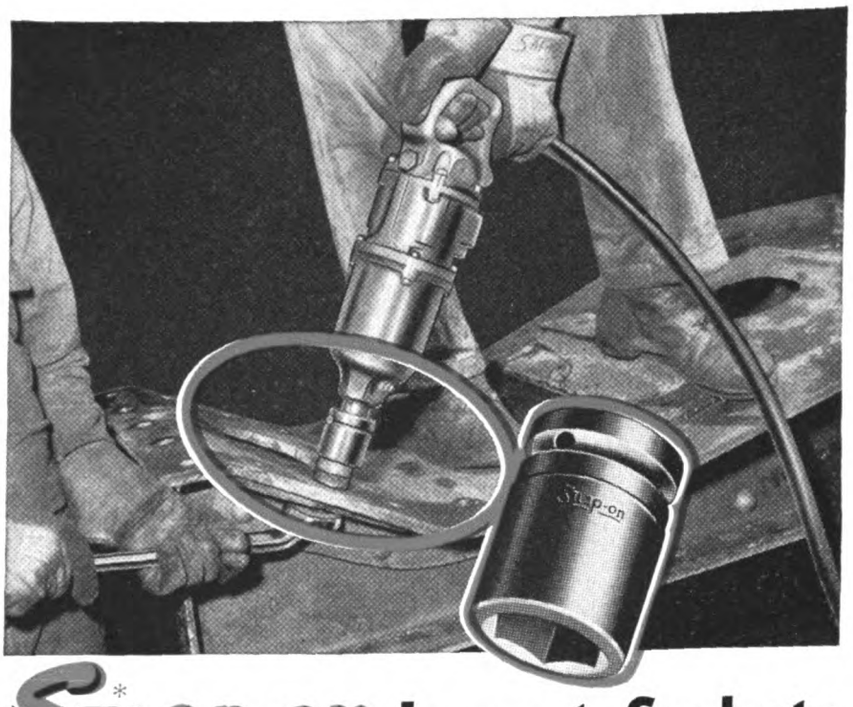
The pump is of the radial piston type which will produce 140 cu in. oil volume per min at 6000 psi and 231 cu in. oil per min at zero pressure. It is driven by a 2 hp, 220 volt motor. A thermal element for 220 volt is standard. *Owatonna Tool Company, Dept. RLC, Cedar st., Owatonna, Minn.*



Air-Powered Hoist

Of 4000-lb capacity and fitted with either roller or link chain, the hoist's lifting and lowering speed varies from a creep to 10 ft per min at full load and 90 psig air line pressure. Length of lift is 8 ft and the hoist operates with either a one-hand control bar or remote pendant control. Its axial-piston compressed air motor assures positive starts and stops and prevents motor burnouts during stalls. When the air supply fails or maximum lowering speed is exceeded, the brake design permits the operator to retain control of the hoist while lowering the load.

The device weighs 100 lb and is



Snap-on* Impact Sockets last 5 times longer . . . and then some

...on Railroad Car Assembly Line

C. S. BRACKEN
Snap-on Sales Engineer

American Car and Foundry, Division of ACF Industries, Incorporated, uses impact sockets in its Huntington, West Virginia, plant on a temporary bolting operation during fabrication of railroad car spines.

Power impact sockets used on this job formerly lasted about 12 shifts. Then *Snap-on* sales engineer, C. S. Bracken, suggested a specially heat-treated *Snap-on* Socket. Result: now, after 65 shifts, the *Snap-on* Sockets have shown no visible sign of wear. Conservative estimates are that this switch to *Snap-on* Sockets will result in a saving of several hundred dollars per year.

Snap-on Railroad Tool Specialist as near as your phone

The *Snap-on* sales engineer is a specialist who devotes *all* of his time to the industrial application of hand tools. He welcomes the opportunity to answer questions and help you get the most out of the tools you use in your business. Write us for his name or call your nearest *Snap-on* branch. Free catalog of industrial wrenches and special railroad tools is yours for the asking.

*Snap-on is the trademark of Snap-on Tools Corporation

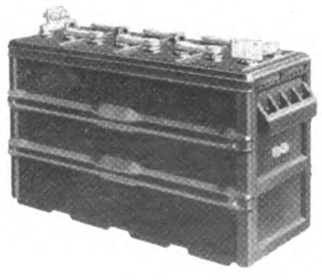
SNAP-ON TOOLS CORPORATION
8130-H 28th Avenue • Kenosha, Wisconsin

NEW BULLETIN gives latest tips on C&D Diesel Starting Batteries

Tells how to reduce locomotive maintenance ... how to 'start your Diesels fast'

Motive power men and purchasing agents will find page after page of useful money-saving information in this comprehensive new bulletin on "Diesel Locomotive Batteries." Expressly prepared to help railroad men specify the right type batteries for dependable Diesel cranking service, this illustrated guide gives the complete "inside story" on the construction and operation of powerful C & D *Slyver-Clad*® batteries. Conventional lead-antimony types . . . special low types . . . as well as the latest lead-calcium extra-long-life types are covered. Detailed charts show you how to specify the exact type battery you need for reliable low-maintenance operation.

Write for a copy. You'll find it an important addition to your technical library.



Batteries built to give quick, sure starts . . .

With extra-thick, extra-long plates . . . and exclusive *Slyver-Clad* construction . . . C & D Diesel Starting Batteries provide power-*plus*. "Better Built Batteries" also assure:

- *high sustained voltage during cranking*
- *reduced connector loss*
- *reduced maintenance requirements*
- *long, dependable operating life*

WRITE FOR BULLETIN DL-577

C&D BATTERIES, INC.

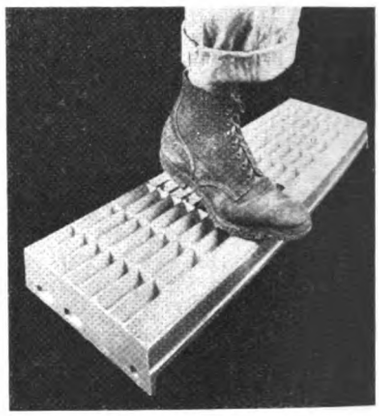
of Conshohocken, Pa.

SINCE 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

equipped with swivel-mounted safety suspension and load hooks. Hook-to-hook dimension is 23½ in.

Accessories include trolleys for the hoist and air hose, a chain basket with a 20 ft capacity, filter-regulator-lubricator and a non-sparking kit to adapt the hoist for operation in explosive atmospheres. *Keller Tool Division, Gardner-Denevr Company, Dept. RLC, Grand Haven, Mich.*



Safety Stairs

A cast aluminum stair tread which combines safer footing with low maintenance has been designed for stairs subjected to extreme weathering or corrosive atmospheres. It is a die-cast tread with a rough slip-proof abrasive nosing and rounded, joint-free corners. Units require no protective coatings.

The treads are cast in one piece to distribute loads more evenly over all bearing bars. In tests the stair has withstood loads in excess of 3,000 lb. The non-skid nosing is made of fused aluminum oxide abrasive bonded to aluminum plate.

Three finishes are available: "As fabricated" surface for structural work, polished finish for sanitary stairway requirements, or a marine finish that is applicable to passenger car design, where treads are subjected to the elements and constant use. The anodized surface, aluminum painted, provides maximum corrosion and abrasion resistance.

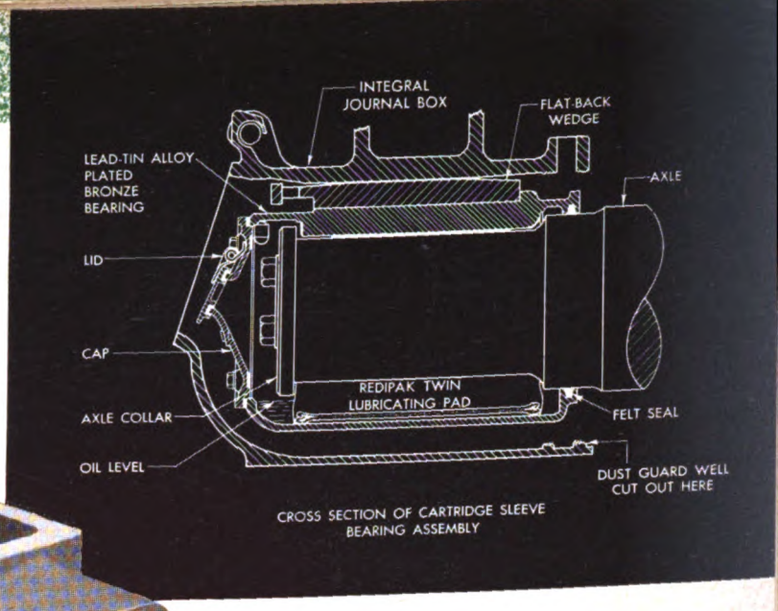
Sizes now range in length from 24 in. to 42 in. Standard width is 10 in., with other widths obtainable. *Aluminum Company of America, Dept RLC, 1501 Alcoa bldg., Pittsburgh 19.*

Quick Tack Adhesive

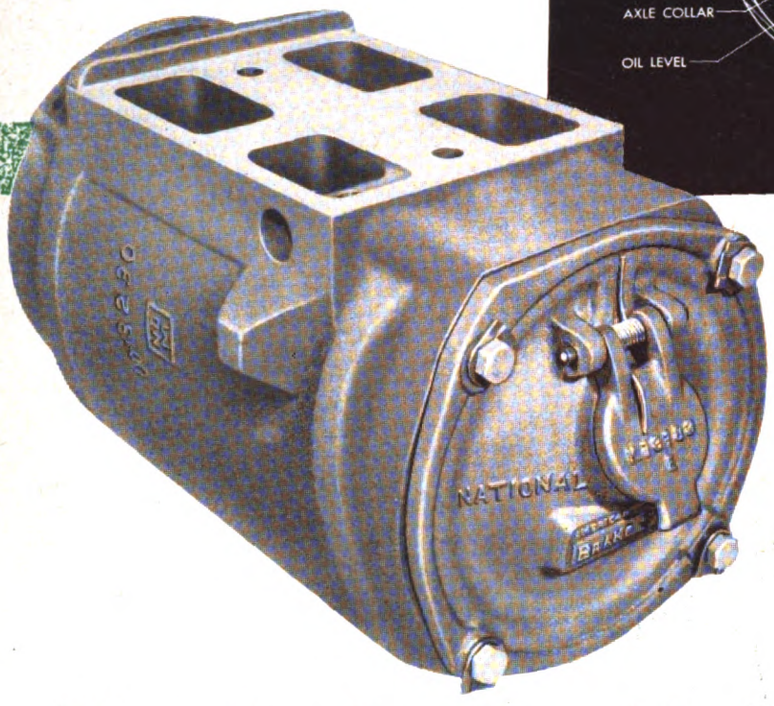
Developed for installing flooring on a production line basis in trains, etc., this quick tacking and early strength adhesive has been designated as LG-735. Water based and trowelable, this gray-white opaque rubber-latex emulsion was designed for installing all types of linoleum with Armstrong Hydrocord, burlap or

(*Continued on page 74*)

The cartridge bearing encircles the journal. The journal collar is machined off to permit assembly, and a separate collar is secured with cap screws. The cartridge unit is cast of high strength bronze and plated with a heavy-duty lead-tin alloy. It contains its own lubricating system and is effectively sealed by a lubricated felt ring riding on the conventional dust guard diameter. The Redipak twin lubricating pad is installed when the cartridge is applied to the axle. Oil is contained in the cartridge, not in the box. The usual journal box lid is not needed.



CROSS SECTION OF CARTRIDGE SLEEVE BEARING ASSEMBLY



Here is the New National Cartridge Bearing!

Road service is now demonstrating that this economical sleeve bearing stands up under today's toughest freight car service

This revolutionary new concept in journal bearing design—now being road tested—may well become the freight car bearing of the future. The National Cartridge Bearing is a complete, sealed bearing and lubricating system. It neatly fits a standard journal box after the dust guard well has been cut out. The bearing encircles the journal—so it cannot lift or shift—and contains its own oil reservoir, Redipak® twin lubricating pad, cover and seal.

Here are a few of the principal advantages offered by the cartridge bearing unit: It stands up to greater impact and braking forces than do roller bearings. It requires very little maintenance—just an infrequent check of oil level and occasional replenishment of oil supply. It assures longer life—no measurable wear on either bearings or journals in over a year's accelerated road service. It minimizes the chances of hot boxes. And finally, it provides savings in initial costs when compared to roller bearings . . . savings in installation and replacement costs . . . and savings in removal costs when a wheel change is needed.

Present service tests on three roads have proven excellent and are validating our laboratory findings. One thousand car sets have been approved by AAR for test in interchange service.

Wheel, axle and cartridge sets are made up in advance for assembly into trucks. No bearing work is done on the rip track.

A-5242

AMERICAN **Brake Shoe** COMPANY

RAILROAD PRODUCTS DIVISION
530 Fifth Avenue • New York 36, N. Y.

NEW! A 35 Ton Hydraulic Journal Jack

First in the Industry!

You asked for it and here it is—a brand new jack designed and built especially for servicing heavier freight cars. It can raise 35 tons 6 inches—is only 9.7 high—weighs but 55 pounds. With the 35H9.7, the job of inspecting and renewing journal brasses can now be done without the danger of overloading a lower capacity hydraulic journal jack—and the work can be done faster with less effort! If you have the problem of lifting heavy cars, we suggest you get complete details on this new 35 ton hydraulic journal jack immediately. Write the world's oldest and largest manufacturer of lifting jacks for bulletin AD29-G.

DUFF-NORTON **Duff-Norton Jacks**

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

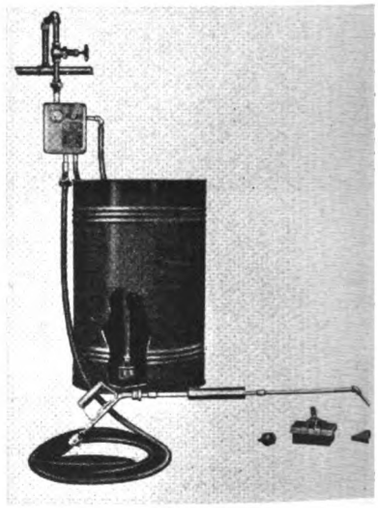
EQUIPMENT

(Continued from page 72)

felt backing to steel, wood and some composition surfaces. It is said to yield a strong and flexible bond. When dry, it is both alkali and moisture resistant.

The product also can be used for bonding linoleum and rubber tile to the same kind of surfaces.

The adhesive has successfully met a series of rigid tests under simulated actual production line operations. Bonding was obtained after aging 1½ hr when linoleum was applied to test specimens of plywood and black iron sheet immediately after the adhesive was spread. *Industrial Division, Armstrong Cork Company, Dept. RLC, Lancaster, Pa.*



Steam Gun

Development of The Turco Steamerette is an injector unit that uses existing steam supplies for steam cleaning, paints stripping, phosphating or sanitizing. Operation requires adjustment of only one valve, this within the range of 40-140 psi of steam. Impinging force is adequate at all pressures within this range. The unit has a built-in pressure gauge to indicate the operating pressure, eliminate fluctuating and assure uniform cleaning. Quantity and pressure of solution vary from a slow full stream at moderate temperature to a hot driving blast for heavy cleaning.

As there are no pumps, motors or equipment maintenance is minimized. The gun is quickly attached to any steam line maintaining an open pressure of 40 lb or more. *Turco Products, Inc., Dept. RLC, 6135 South Central ave., Los Angeles 1.*

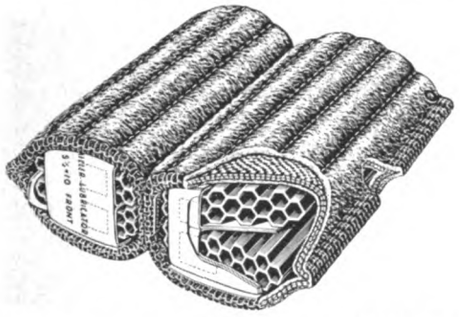
Chemical Resistant Coating

Rubber-Coat Liquid Hypalon is the first Hypalon made available to the industrial maintenance trade in the form of a

(Continued on page 76)

FOR PROGRESSIVE RAILROADING

102,000 CARSETS TO DATE



MILLER CENTER-FEED PAD LUBRICATORS

NOW
MADE IN CANADA
TOO

FOR CANADIAN RAILROADS

The lubricator that can be applied or removed without jacking box in winter or summer.

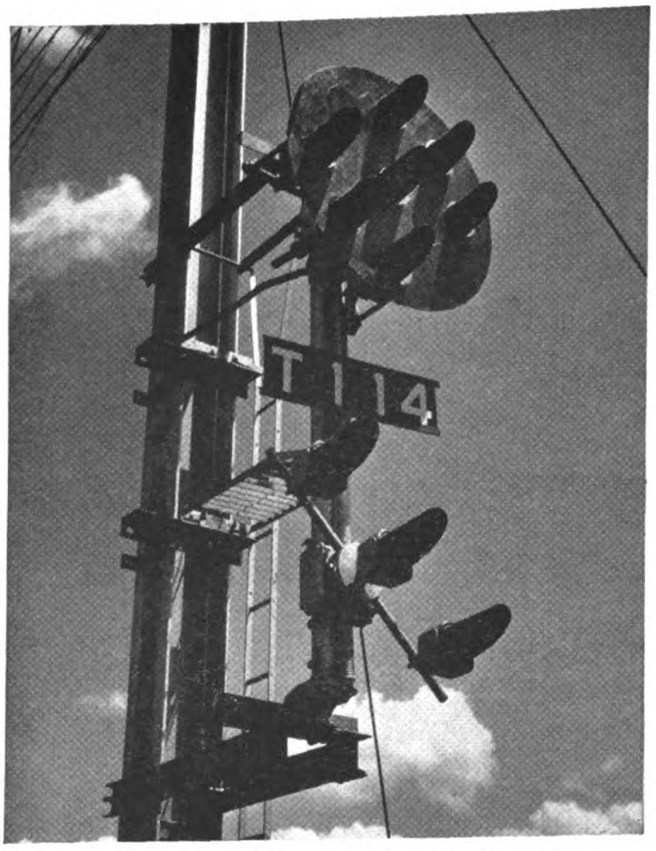
Any quantities. Life expectancy—6 years.

Lowest prices—F.O.B. Napanee, Ontario or Winona, Minn.

Immediate Delivery, Any Quantity

FROM BOTH PLANTS

MILLER LUBRICATOR CO.	NAPANEE IRON WORKS, LTD.
Winona, Minnesota	Napanee, Ontario and Montreal, Quebec, Canada



More Ex-Cell-O pins and bushings than any other kind will pass this signal

Over 200 U.S. and Canadian railroads bank on Ex-Cell-O Pins and Bushings. Why?

Because these bushings *last longer* thanks to a super-fine finish and a diamond-hard, specially heat-treated steel case. A giant stock at our warehouses assures fast delivery of any size or quantity—and every order is backed up with an extraordinary service policy. Available assembled or separately, Ex-Cell-O Pins and Bushings wear longer because they're made better.

Order directly from the convenient Ex-Cell-O Catalog . . . or contact your Ex-Cell-O Representative.

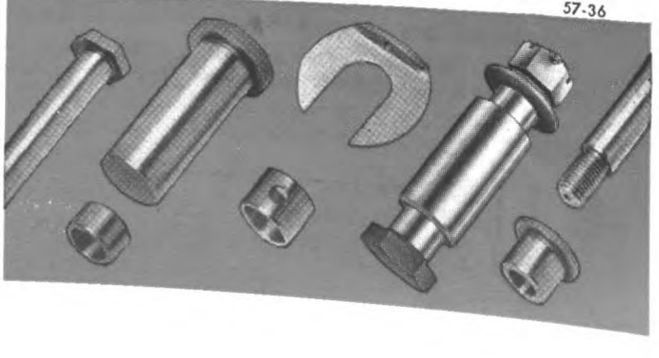
EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

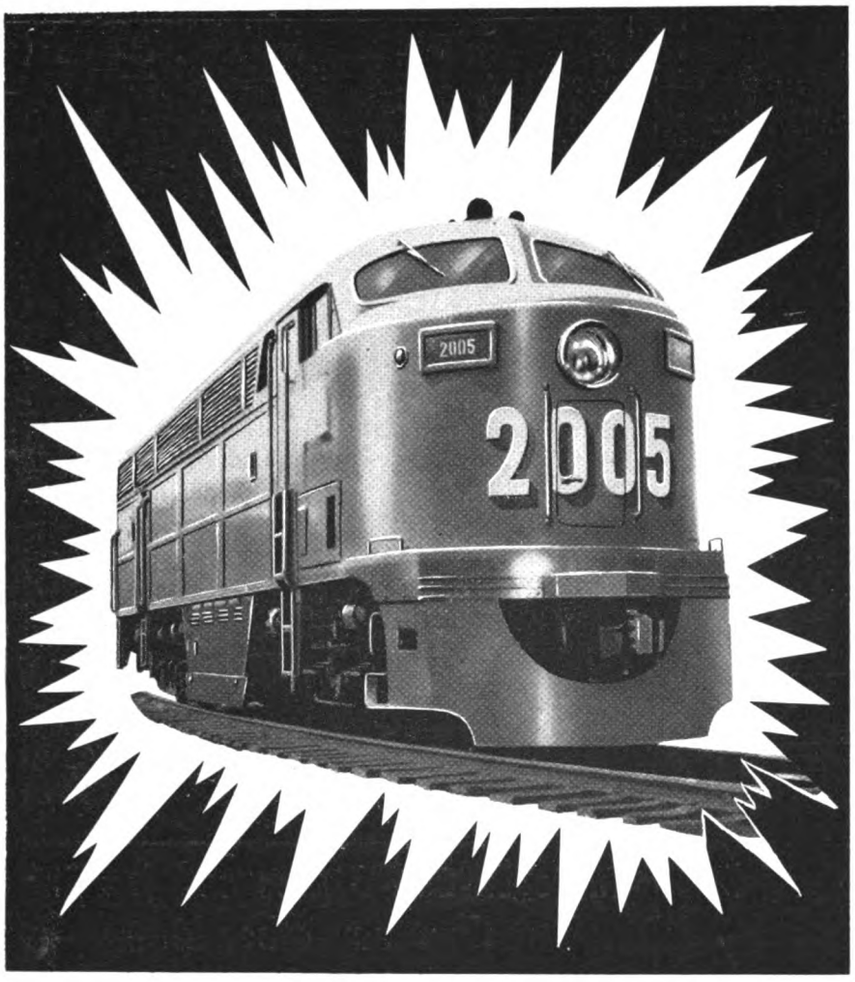
EX-CELL-O FOR PRECISION

XLO

RAILROAD DIVISION • DETROIT, MICHIGAN • LONDON, CANADA

57-36





YOU CAN PRESERVE THAT FRESHLY-PAINTED LOOK

. . . on diesel locomotive or caboose.

Why allow your locomotives or cabooses to quickly become dingy and dull when you can retain their like-new appearance with this simple two-step preventive method?

MAGNUS METHOD

1. Wash painted surface down first with water; then, scrub it from the bottom up with a fairly heavy solution of MAGNUS SUPER SURFACE CLEANER, being sure that you rinse it thoroughly before the Surface Cleaner can dry.
2. Now, with the surfaces thoroughly clean and dry, spray on a coat of MAGNUS RRFF-111 CLEAR GLOSS. One coat should be sufficient.

The result . . . a surface which may now be kept bright and new by occasional easy-washings, using a minimum of cleaning material and water. No strong alkalies or solvent type cleaners are needed, nor should they be used. Saves the cost of frequent refinishing.

For that "like-new" look for many tomorrows, be sure to write today for free, detailed information on this modern maintenance method. Write MAGNUS, 77 South Avenue, Garwood, New Jersey.

magnus

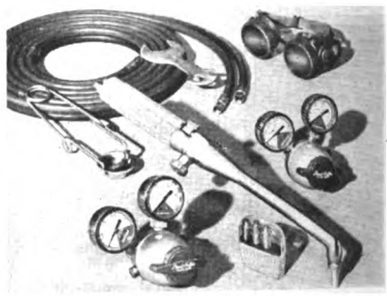
RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
—a world-wide organization specializing in cleaning and protection of all surfaces.

EQUIPMENT

(*Continued from page 74*)

liquid brushable and sprayable film. It is said to be extremely inert to almost any type of chemical attack, and is available in white and bright colors so as to be easily identifiable on various pieces of equipment.

The coating is unaffected by ozone, which is a destructive agent for paint coatings generally. In addition, it is unaffected by petroleum derivatives, which enables petroleum-handling equipment to be identified with distinctive colors. The product was jointly engineered by E. I. du Pont de Nemours & Co. and Wilber & Williams. *Wilber & Williams Co., Dept. RLC, 130 Lincoln st., Boston 35.*



Oxy-acetylene Welding and Cutting Outfit

The new Presto-O-Lite No. 420 welding and cutting outfit is capable of welding up to ⅜-in. and cutting up to 2-in.

Changes in the No. 420 blowpipe make it easier to use. The cutting oxygen lever has been moved to top of handle where it can be turned on and off with the thumb. A green plastic ring has been placed around the oxygen valve and a red ring around the acetylene valve for quicker and positive identification. Plastic gage crystals for oxygen and acetylene regulators have been replaced by non-clouding glass kept in place with a screw-type retaining ring.

The No. 420 outfit includes the No. 420 blowpipe, R-412 and R-413 regulators, four interchangeable tips, 12½-ft twin hose, goggles, friction lighter, wrench and complete instructions. *Linde Company, Division of Union Carbide Corporation, Dept. RLC, 30 East 42nd st., New York 17.*

Set Screw Chain

Hexkes, a ring-chain combination for keeping a complete set of socket screws together, permits use of either end of any key without removal. Each key is fastened by a sliding ring, permitting key to be rotated without winding the chain

(*Continued on page 78*)

ENGINEER'S FIELD REPORT

PRODUCT CHEVRON FILTER COAT

FIRM FARR COMPANY
Los Angeles, Calif.

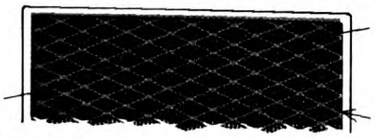
Air filter firm uses Chevron coating exclusively

Farr Co. supplies impingement-type air filters, oiled with Chevron Filter Coat, to nearly all major railroads. A leader in air filtering, Farr has used Chevron Filter Coat (formerly Calol) exclusively for three years, since product was introduced.

Farr's Director of Research, S.F. Duncan, recommends gel-structure oils like Chevron Filter Coat because they improve filter efficiency. Other users report Chevron Filter Coat increases filtering efficiency as much as 50% over oils they previously used.

A heated centrifugal oiler of their own design (above) applies Chevron Filter Coat to all Far-Air filters just before they are packed for shipment. Filters are immersed in heated oil for 30 seconds, then raised and spun at 300 rpm for a minute to remove excess oil.

Why Chevron Filter Coat ups efficiency of air filters



- High wicking ability—quickly soaks dust particles
- Will not drip off screens—gives full filtering efficiency through entire service period
- Easily applied and cleaned—but will not wash off in service
- Does not separate, harden, or change properties in service
- Non-corrosive to metals

CHEVRON Industrial Lubricants

For More Information about this or other petroleum products, or the name of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "CHEVRON" AND "CHEVRON" DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

NOW! We Can Service Your Traction Motor Field Coils

WITH EPOXI-MICA INSULATION

GIVING

1. HIGH DIELECTRIC STRENGTH.
2. HIGH THERMAL STABILITY.
3. EXCELLENT HEAT TRANSFER.
4. MOISTURE AND CHEMICAL RESISTANCE.
5. HIGH MECHANICAL STRENGTH.

New and rebuilt field coils can be supplied cast to pole pieces.

First to service the largest railroads with this EPOXY insulation.

MOTOR COILS MFG. CO.

401 Martindale St. Pittsburgh, Pa.

America's foremost engineered lettering tools

DN

designed to reduce your present costs **50 to 80%**

Used today by 1/3rd of the Nation's leading Railroads . .

Spray it® **STENCILS**

PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

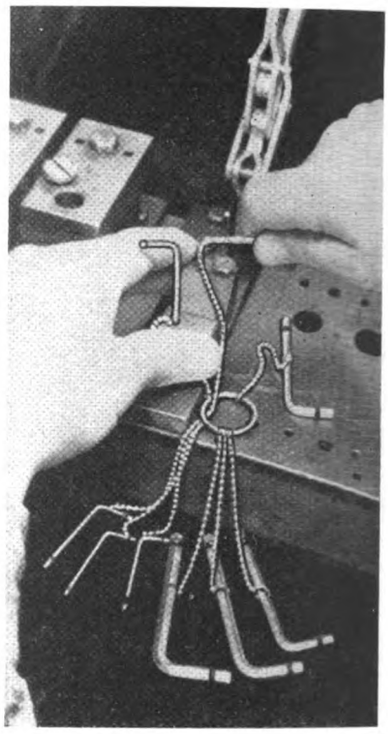
THE DEMP-NOCK COMPANY

21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.

DEMP NOCK®

EQUIPMENT

(*Continued from page 76*)



around it. Standard assortment includes 9 keys, .050 to ¼ in. inclusive. Set is heat treated, finished black, and completely assembled. *Hard Inc., Dept. RLC, 3500 Pontiac Road, Ann Arbor, Mich.*

Powder Blower

A completely self-contained, lightweight portable unit, model No. 58600, is now available for the application of dry Magnaflux powder. A simple adjustment controls the density of the powder and two push buttons permit selection either of powder or clean air. It operates directly from any air line and requires only 20 psi.

The blower is compact and weighs only 2¼-lb empty. It is simple to operate and, according to the manufacturer, has advantages over the shaker-type powder bulbs in that it is faster, covers a wider area and distributes the magnetic particles evenly. *Magnaflux Corporation, Dept. RLC, 7300 West Lawrence ave., Chicago 31.*

PERSONAL MENTION

(*Continued from page 12*)

H. T. Rainey, Jr.

tendent car department, appointed superintendent motive power and equipment. *Career:* Entered service of RF&P in 1943 as clerk. After holding various positions, including a short tour of duty with the AAR, returned to RF&P as assistant chief car inspector. Became chief car inspector and in December 1956 superintendent car department.

Toronto, Hamilton & Buffalo.—Mechanical departments consolidated under J. W. ROWLEY, chief mechanical officer, with jurisdiction over locomotive and car departments. Headquarters, Hamilton, Ont. N. H. CRAIG, superintendent of car department, retired. Positions of superintendent car department and master mechanic abolished.

Supply Trade Notes

K. W. BATTERY COMPANY,—*Robert C Cragg*, formerly midwest regional manager for Gould National Batteries, Inc., has been appointed executive vice-president, with headquarters at Skokie, Ill.

■

FARREL-BIRMINGHAM COMPANY, CONSOLIDATED MACHINE TOOL DIVISION. —*Robert R. Miller* has been appointed western sales representative, with headquarters at 6048 Lewis ave., Long Beach 5, Cal. *Leonard W. Lindh* has been appointed sales representative in New Jersey, Eastern Pennsylvania, Delaware and Maryland, with headquarters in Rochester, N. Y., succeeding *Robert L. Arms*, retired. *Harlan J. Hauser* has been appointed assistant sales manager at Rochester.

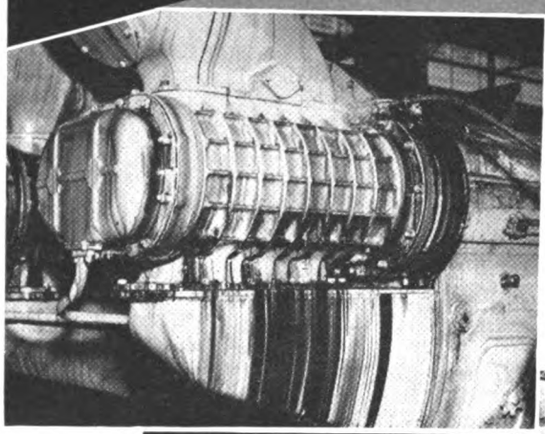
■

GRIFFIN WHEEL COMPANY.—*Curtis C. Drake*, sales representative in Denver, retired June 30.

■

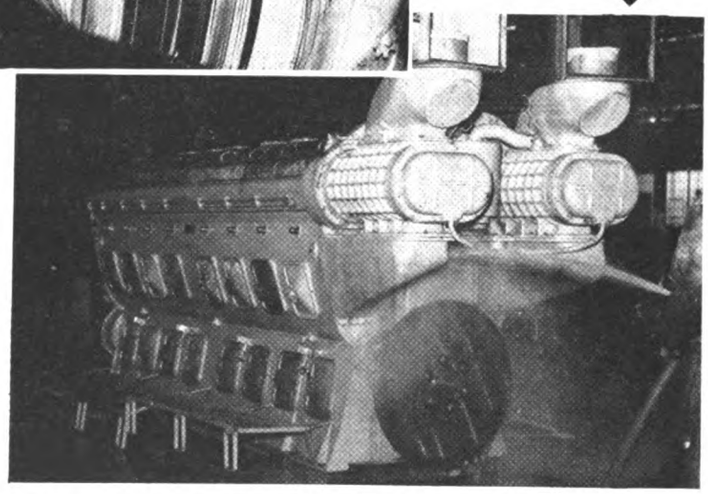
JOHNS-MANVILLE CORPORATION. —*Clinton B. Burnett*, J-M vice-president, has been appointed division general manager of the Packings and Friction Materials Division, succeeding *Francis J. Wakem*, retired.

CLEAN 16 cylinder E.M.D. engine in only 40 minutes with reduced LIX DIESEL KLEAN HEAVY



Just spray on reduced Lix Diesel Klean Heavy and watch the soil roll off.

Then rinse with warm water, air blow, and it's ready to paint.



Leading railroads say . . . "Nothing cleans faster or better at less cost, than reduced Lix Diesel Klean Heavy."

LIX CLEANERS were laboratory developed and tested, then field proven by years of use in many leading railroad shops.

Fewer man hours per job means greater volume of work without additional labor. LIX reduces the usual necessary cleaning time to a minimum.

Since LIX cleans better in less time the result is substantial savings in labor and material costs . . . exactly what progressive railroads are seeking.

If you want to get better results . . . save valuable hours, labor and material costs, then investigate LIX. We will gladly demonstrate in your shop.

Lix Diesel Klean Heavy is non-toxic by Interstate Commerce Commission test standards.

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix PRODUCTS OF RESEARCH CORPORATION (OF MISSOURI)

716 EAST 85TH STREET, Dept. RL-8
KANSAS CITY, MISSOURI

"Leadership in Industrial Cleaning"

SUPPLY TRADE NOTES

(*Continued from page 79*)

E. P. Bullard III

R. H. Waite

BULLARD COMPANY.—*E. C. Bullard,* has been elected chairman of the board and chief executive officer. *E. P. Bullard II* succeeds E. C. Bullard as president and general manager.

■

MACLEAN-FOGG LOCK NUT COMPANY—*Robert H. Waite* has been appointed railroad sales manager.

■

UNITED STATES RUBBER COMPANY.—*Henry Davis, Jr.,* district sales manager for mechanical good at Baltimore, has been appointed assistant manager of branch sales for the mechanical goods division, with headquarters in New York.

■

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—"For developing the diesel-electric locomotive which helped revolutionize Amercan railroading," *Harold L. Hamilton,* retired vice-president and founder of Electro-Motive; *Richard M. Dilworth,* retired chief engineer; *Eugene W. Kettering,* director of research, and four sections of the Engineering Department of Electro-Motive—Controls, Electrical, Locomotive, and Mechanical Engineering Sections—will receive the 1957 Elmer A Sperry Award. The award will be presented at a specal luncheon on Thursday, October 10, during the fall general meeting of the American Institute of Electrical Engineers to be held at the Morrison Hotel, Chicago.

Harold O. King, factory branch superintendent in Jacksonville, Fla., has been appointed manager of that branch, succeeding *Alfred R. Walker,* retired.

■

CRUCIBLE STEEL COMPANY OF AMERICA.—*Albert J. McConnell* has been appointed assistant branch manager at Baltimore, Md.

■

WYANDOTTE CHEMICALS CORPORATION, J. B. FORD DIVISION.—*W. C. Van Keuren* has been appointed manager of the New York district office succeeding *A. J. Bettelheim,* retired. *John K. Stanz* of the Philadelphia district office succeeds Mr Van Keuren as district sales manager at Philadelphia. *Robert Haberl* has been appointed sales manager of the Kansas City district.

■

ALPHA MOLYKOTE CORPORATION.—A Technical Services Division has been organized to handle engineering information on molybdenum disulfide lubricants. The division is under the directon of *Harry S. Gerstung.*

■

GOULD - NATIONAL BATTERIES, INC.—*Harold M. Cragg,* specifications engineer, has been named St. Paul district manager of the Industrial Division.

■

KLEMP METAL GRATING CORPORATION.—*Gerald T. Hughart* has been appointed general manager at Chicago.

■

ACF INDUSTRIES, AMERICAN CAR & FOUNDRY DIVISION.—*Howard J. Russell* and *Edmund M. Grant* have been appointed district sales managers at Washington, D. C., and Chicago, respectively. Mr. Russell has been assistant to vice-president in the division's general sales office in New York, and Mr. grant has been a sales representative in Chicago.

■

SYMINGTON-GOULD CORPORATION.—*John W. Bergen* has been appointed assistant vice-president with headquarters in Chicago as heretofore.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—The Charles H. McCrea award for unusual contribution to the industry was presented on June 13 to *Wilson H. Moriarty,* first vice-president of National Malleable, by the Malleable Founders' Society for his efforts in founding the Malleable Research and Development Foundation. The Foundation was organized last fall

(*Continued on page 83*)

FOR SALE

FAIRBANKS, MORSE CO. — OPPOSED PISTON DIESEL ENGINE SPARE PARTS

NEW-UNUSED — BIG SAVINGS

Crankshafts (Upper & Lower)
Blowers
Vertical Drive Assembly
Bearings—Main, Con. rod
Connecting Rods
Pistons
Many other parts

SERVICE PARTS DIVISION
A. G. SCHOONMAKER COMPANY, INC.

New York Address	California Address
50 Church Street New York 7, N.Y. Ph. Digby 9-4350	Ft. Spring Street Sausalito, Calif. Ph. Edgewater 2-1490

FOR SALE

New General Electric Traction Generators

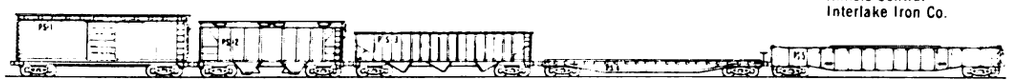
Manufactured 1955 and 1956—
Never installed—With Exciters

7 Model GT-591-A 1200 HP
15 Model GT-590-A1 1600 HP

— wire or phone collect —

C. Kirk Hillman Co., Inc.
3201 First So. Eliot 6561 Seattle 4, Wash.

PS-1
PS-2
PS-3
PS-4
PS-5



PS-1 box car, PS-2 covered hopper, PS-3 open hopper, PS-4 flat car, PS-5 gondola

standardized freight cars

from the experience of the world's largest carbuilder

More than eleven years ago, Pullman-Standard made a long-considered departure from traditional carbuilding concepts of custom design and construction, by introducing the first standardized freight car, the PS-1 Box Car. Pullman-Standard drew on its 80 years of carbuilding experience to conceive and engineer a car design that would serve equally well on all parts of the Great American Railway System. Modern mass production techniques, impossible to apply to custom-produced units, were developed for the production of this revolutionary car. These same economical, high-standard methods are now used by Pullman-Standard in the building of the complete line of standardized freight cars . . . the PS-2 Covered Hopper, PS-3 Open Hopper, PS-4 Flat Car and now, the new PS-5 Gondola.

The new PS-5 Gondola is the result of over eight years of exhaustive design and engineering effort. The Pullman-Standard concept of *flexible* standardization allows application of the economies and quality controls of mass production while providing sufficient design versatility to meet the varied use requirements of owners and shippers. Two standard PS-5 lengths are available with either fixed or drop ends and with a choice of floors.

Your nearest Pullman-Standard office will be pleased to supply you with full information on the complete line of P-S Standardized Freight Cars.

WORLD'S LARGEST BUILDER OF ROLLING STOCK

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS

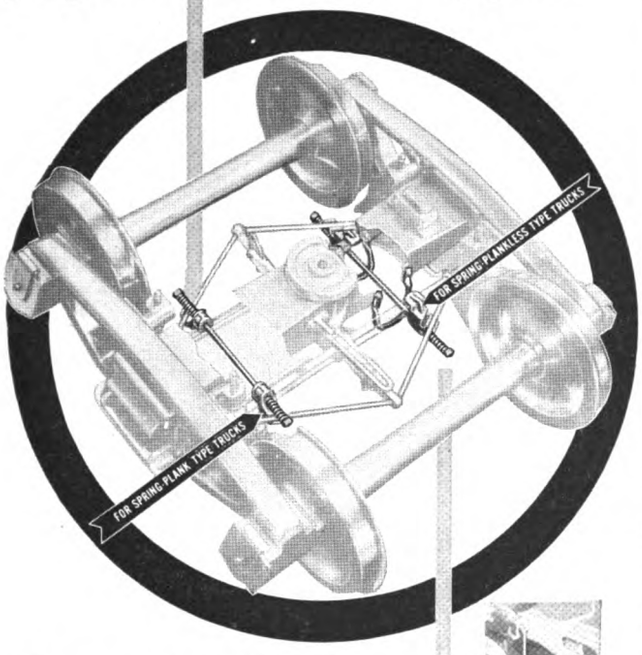
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

Relied on by:

Akron, Canton & Youngstown
Alabama Power Co.
Amer. Smelt. & Ref. (Mexico)
American Sugar Refining
Ann Arbor Railroad
Atchison, Topeka & Santa Fe
Atlanta & West Point
Baltimore & Ohio
Bangor & Aroostook
Bessemer & Lake Erie
Birmingham Southern
Boston & Maine
Buffalo Creek R.R.
Canadian National
Canadian Pacific
Central Soya
Central of Georgia
Central R. R. of New Jersey
Chesapeake & Ohio
Chicago, Burlington & Quincy
Chicago & Eastern Illinois
Chicago & Illinois Midland
Chicago & North Western
Chicago Great Western
Chgo., Milw., St. Paul & Pac.
Chgo., Rock Island & Pacific
Chgo., St. Paul, Minn'pls & Omaha
City of Chicago
Clinchfield
Columbus & Greenville
Copper Range
Delaware & Hudson
Delaware, Lackawanna & West'n
Denver & Rio Grande Western
Detroit, Toledo & Ironton
Duluth, Messabi & Iron Range
Duluth, So. Shore & Atlantic
Elgin, Joliet & Eastern
Erie
Escanaba & Lake Superior
Ferrocarril Del Pacifico
Florida East Coast
Ft. Dodge, Des Moines & South'n
General American Trans.
Georgia Railroad
Western Railway of Alabama
Grand Trunk Western
Great Northern
Green Bay & Western
Gulf, Mobile & Ohio
Illinois Central
Interlake Iron Co.
J. C. Corrigan Co.
Kansas City Southern
Lake Superior & Ishpeming
Lancaster & Chester
Lehigh Valley
Lehigh & New England
La Salle & Bureau County
Louisville & Nashville
Maine Central
Minn'pls, Northfield & South'n
Minneapolis & St. Louis
Mississippi Central
Missouri-Kansas-Texas
Monon
National Sugar Refining
Nashville, Chattanooga & St. Louis
New Haven
New York Central
N. Y., Susquehanna & Western
Nickel Plate
Norfolk & Western
North American Car Co.
Northern Pacific
Oliver Mining Co.
Pennsylvania
Phila. Qtz. of Cal.
Pittsburgh & West Virginia
Richmond, Fred'bg & Potomac
Rutland Ry. Co.
Santos a Jundiai
St. Louis-San Francisco
St. Louis Southwestern
Savannah & Atlanta
Soo Line
Seaboard Air Line
Southern Pacific
Southern Railway
Tennessee Central
Texas-Mexican
Toledo, Peoria & Western
Union Pacific
Union Railroad
U. S. Army
U. S. Navy
U. S. Trans. Corps
U. S. War Department
Utah Railway
Virginian
Wabash
Western Maryland
Western Pacific

in your rebuilding program

the GRIPCO Brake Beam Safety Support



gives added safety at minimum cost

SPRING-PLANK TYPE

can be designed for ANY Brake Beam

The Gripco Brake Beam Safety Support provides the greatest safety at lowest cost. Its dependability has been proven over years of actual service. Gripco Safety Supports are low in original cost, low in application cost and low in maintenance cost, even after years of service.

SPRING-PLANKLESS TYPE
(Safety Loops Included)

1. Supports the brake beam in event of brake beam or hanger failure.
2. Holds brake beam in horizontal position.
3. Holds brake shoes in proper position in relation to the periphery of the wheel.
4. The brake release feature pulls brake shoes away from wheel contact instantly when brakes are released.
5. Prevents unnecessary wheel and shoe wear caused by dragging brake shoes.
6. Gripco Supports can be removed and replaced without removing nuts.
7. Gripco Supports also function as a foundation brake gear control.
8. Brake Beams, rods and levers are held in position under spring tension thus reducing false movements, chattering and wear of parts to a minimum.

A.A.R. APPROVED—PATENTED AND PATENTS PENDING

OTHER GRIP NUT PRODUCTS AD NO. 110

Grip Lock Nut #1 | Grip Holding Nut #2 | Railroad Gripco Lock Nut #3

GRIP NUT COMPANY

Serving American Railroads Since 1904

106 BROAD ST., • SOUTH WHITLEY, IND.

EQUIPPED WITH *AIR-Push* OF COURSE!

SPRAGUE *AIR-Push* WINDSHIELD WIPER MOTORS ARE "STANDARD" IN THE INDUSTRY

First in heavy duty windshield wiping equipment for a quarter century . . . . used on more than 90% of all diesel operated locomotives. *Safety starts with seeing* and Air-Push equipment keeps windshields clear in bad weather. Designed for top performance with minimum maintenance. Air-Push Replacement Kits, and Air-Push Repair Kits immediately available.

WRITE FOR COMPLETE DETAILS!

Sprague DEVICES, INC.,
Michigan City, Indiana

WESTERN LOCOMOTIVE and CAR JACK

lifts capacity
loads easier

WESTERN has made the first major change in Locomotive and Car Journal Jacks by adding Timken tapered thrust roller bearings, replacing ball bearings. This major improvement means reduced friction, greater speed, easier operation and less maintenance . . . available in 25, 35 and 50 ton capacities. Aluminum or malleable steel housings available in 25 and 35 ton models.

8018

Write for Bulletin No. 1957

WESTERN RAILROAD SUPPLY COMPANY

Division of Western Industries, Inc.

2400-2434 S. Ashland Ave., Chicago 8, Ill.

SUPPLY TRADE NOTES

(Continued from page 80)

to develop new products, improved processes, and more efficient production equipment for the malleable iron industry. The group now comprises six companies.

■

COOPER-BESSEMER CORPORATION —*Robert F. Lay,* vice-president and general sales manager, has been appointed vice-president and assistant general manager. *Grant C. Woodard,* assistant general sales manager, has been appointed general sales manager.

■

VANADIUM CORPORATION OF AMERICA.—*Lloyd W. Lewis,* district representative, has been appointed sales manager, eastern district, at New York; *William J. Killian,* district representative, has been named assistant district manager of the Pittsburgh district; and *John J. Green,* service engineer, has been appointed manager, wrought steel service, at Pittsburgh.

■

ARMOUR & CO.—*James P. Coughlin* has been appointed general sales manager, Cushioning Products Division, Alliance, Ohio.

In 1953 Mr. Coughlin was division manager of Welding, Westinghouse Electric Corporation, in Buffalo. Prior to joining Armour & Co. he was assistant to the president, Eutectic Welding Alloy Corporation.

■

PRIME MANUFACTURING COMPANY.—*W. H. Welty* has been appointed general sales manager with headquarters in Milwaukee.

■

OLIN MATHIESON CHEMICAL CORPORATION.—*R. Carter Dye* has been appointed general sales manager for Olin Aluminum, Aluminum division of Olin Mathieson.

■

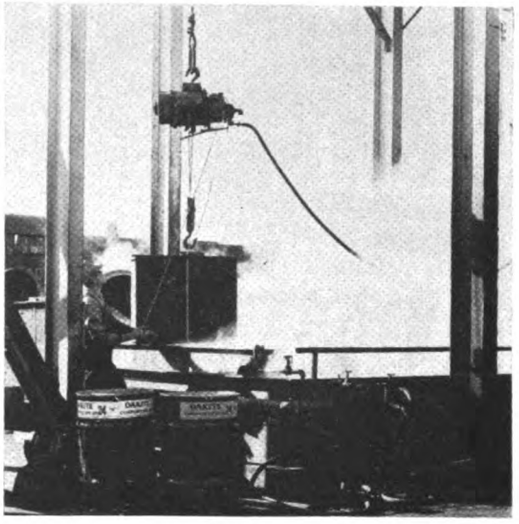
DEVILBISS COMPANY.—Direct factory branch facilities for Northern California are being moved from Santa Clara to a new building at 135 North 10th st., San Jose. New facilities have also been established in Los Angeles to serve Southern California and Arizona; in Seattle for the Pacific northwest, and at Salt Lake City for the Inter-Mountain area.

■

CRUCIBLE STEEL COMPANY OF AMERICA.—*Geo. W. Stamm* has been elected vice-president and general manager of sales, succeeding *James D. Glenn,* who has been relieved of his responsibility as vice-president-sales because of illness. *C. J. Ryan* has been appointed assistant to the vice-president-sales, with headquarters in Detroit. *M. J. Dempsey* succeeds Mr. Ryan as manager of the Detroit sales branch.

Mr. Stamm has been with Crucible since 1940 when he joined the St. Louis sales branch as a sales trainee. He was subsequently a tool steel service engineer at Syracuse, N.Y., assistant manager

In PARTS CLEANING, too



Oakite gives you

low-cost end results

RECORDS PROVE that in back shop tank cleaning operations, the solution that can clean at lower concentration and last longer gives by far the best economy.

For instance: When switching to an Oakite Cleaner, one shop found that it cost less to *charge* the tank, less to *keep it up*—so that in 12 weeks, savings totalled over $300.

Another railroad shop recorded a yearly saving of over $4100 on material cost alone for tank cleaning of diesel heads, liners, pistons and other parts in a solution of Oakite Composition No. 24. This solution was used for a full year with minimum upkeep, while previous cleaner had to be dumped and replaced every 2nd month.

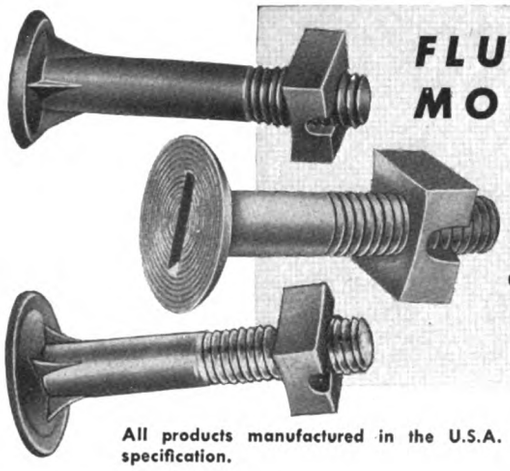
No matter what the maintenance cleaning job, there are *genuinely* economical, efficient Oakite materials to help you keep costs down. Get information on these and also up-to-the-minute methods and equipment from 56-page Booklet No. F-8055. Write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE®
MATERIALS · METHODS · SERVICE
SCIENCE

RAILROAD DIVISION

Export Division
Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada



FLUSH FIT MOISTURE TIGHT..

...WITHOUT COUNTERSINKING

Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

and manager of the Cleveland sales branch, assistant to the vice-president-sales at Pittsburgh, assistant general sales manager and general manager of sales. Mr. Stamm received a B.S. in civil engineering from Washington University, St. Louis.

A new Crucible stainless-steel sales office and warehouse has been opened at 3400 Malone Drive, Camblee, Atlanta, Ga.

■

SYMINGTON - GOULD CORPORATION.—*Robert P. Messimer,* formerly service engineer, has been appointed sales engineer, with headquarters in New York City.

■

GOULD - NATIONAL BATTERIES, INC.—*Harold M. Cragg* has been appointed district manager of the Industrial Division at 1728 Roblyn ave., St. Paul, Minn. Mr. Cragg will supervise sales and service in Minnesota, Iowa, and South Dakota.

■

BALDWIN-LIMA-HAMILTON CORPORATION. STANDARD STEEL WORKS DIVISION.—*Thomas H. McKoy* has been appointed salesman in the Pittsburgh area which comprises western Pennsylvania, southern Ohio, western Maryland, and West Virginia.

■

AMERICAN BRAKE SHOE COMPANY.—The New York offices of ABS are now location at 530 Fifth ave., New York 6.

■

COPCO STEEL & ENGINEERING CO.—*Fred T. Roffe* has been appointed manager railway sales, with headquarters at 420 Lexington ave., New York 17. Mr Roffe was formerly with the Waugh Equipment Company.

Obituary

FRANCIS HENRY SHEPARD, 82, pioneer in railroad electrification, died on June 22 in Bennington, Vt. Mr. Shepard retired in 1932 as director of heavy traction, Westinghouse Electric & Manufacturing Co., but continued as a consulting engineer.

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

CUTTING NOZZLES. Folder describes features of Oxweld cutting nozzles and how built and tested to give peak performance. (Write: *Linde Company, Division of Union Carbide Corp.,* Dept. RLC, 30 East 42nd st., New York 17.)

WELDERS. Four-page bulletin gives construction details and specifications for Idealarc 300, 400 and 500-amp combination ac and dc welders. (Write: *Lincoln Electric Company,* Dept. RLC, Cleveland 17.)

TEFLON HOSE. Bulletin IEB-26A describes Aeroquip 2802 industrial Teflon hose with "super gem" fittings for use with detachable fittings. (Write: *Aeroquip Corporation,* Dept. RLC, Jackson, Mich.)

HYDRAULIC CRANE. Four-page bulletin reports on use of Austin-Western hydraulic crane in Burlington repair yard at Lincoln, Neb. (Write: *Austin-Western Works, Baldwin-Lima-Hamilton,* Dept. RLC, Aurora, Ill.)

BLAST CLEANING. — "Wet Blast Cleaning and Finishing News" discusses and illustrates many applications of wet blasting, both in metal cleaning and finishing operations. Advantages of Liquamatte wet blasting enumerated. (Write: *Wheelabrator Corporation,* Dept. RLC, Mishawaka, Ind.)

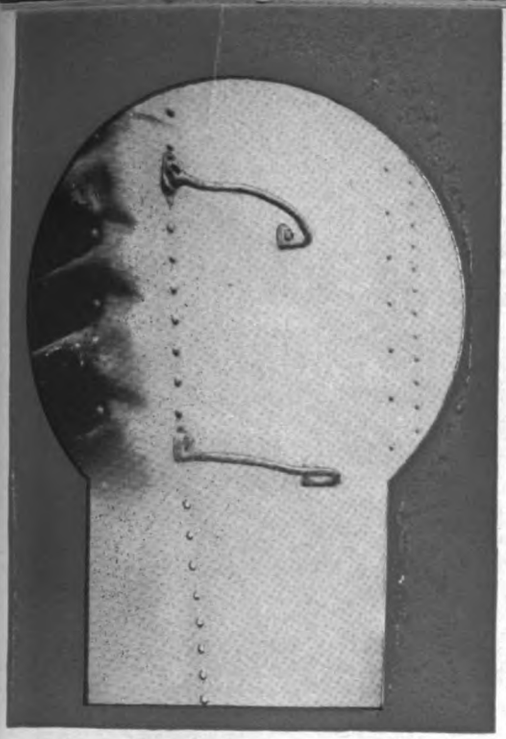
PROTECTIVE LININGS. 4-page brochure discusses application of protective linings and coatings and cites a case history where detergent-hauling tank cars were protected from premature failure at area of rivet heads and edges with a combination lining system of stainless steel and baked phenolic. (Write: *Protective Coatings Division of Metalweld, Inc.,* Dept. RLC, Scotts Lane and Abbottsford ave., Philadelphia 29.)

VERTICAL TURRET LATHES. 24-page catalog (VTL-3) presents entirely new concepts of operating speed, simplicity and convenience of company's line of 32-m 42- and 52-in. vertical turret lathes. Describes and illustrates new electric clutch controlled coaxial planetary transmission, also a variety of attachments and optional equipment, including system of tape automated numerical control of a vertical turret lathe and a precision racer control system. (Write: *Kaukauna Machine & Foundry Division of Giddings & Lewis Machine Tool Company,* Dept. RLC, Kaukauna, Wis.)

PIPE AND TUBING. 48-page catalog describes the Contour Trentwood process of welding stainless-steel and high-alloy pipe and tubing. Describes also Trent Tube products ranging in size from ⅛ in. to 40 in. in outside diameter, with hardness, conversion, size range, corrosion, gage and other tables and a glossary of tubing terms. (Write: L. E. Baker, sales supervisor, *Trent Tube Company,* Dept. RLC East Troy, Wis.)

ABRASION RESISTING STEEL.—Four-page revised Bulletin No. 11-3 describes a specially balanced composition for hardness and ductility, supplied in sheet and plate form for structures and equipment subjected to abrasion. Includes information on fabrication and heat treatment, performance records and illustrations of applications. (Write: *Joseph T. Ryerson & Son., Inc.,* Dept. RLC, Box 8000-A, Chicago 80.)

SELECTING POWER FOR PUMPING. 12-page illustrated handbook, No. ED-716, contains checklist of features necessary for dependable operation on pumping jobs, also description of engine requirements. Examples of efficient installations shown. (Write: *Caterpillar Tractor Company,* Dept. RLC, Peoria, Ill.)



DAMAGED GRAB IRONS AND LADDERS

CAN NOW BE REPAIRED FROM *Outside* THE CAR!

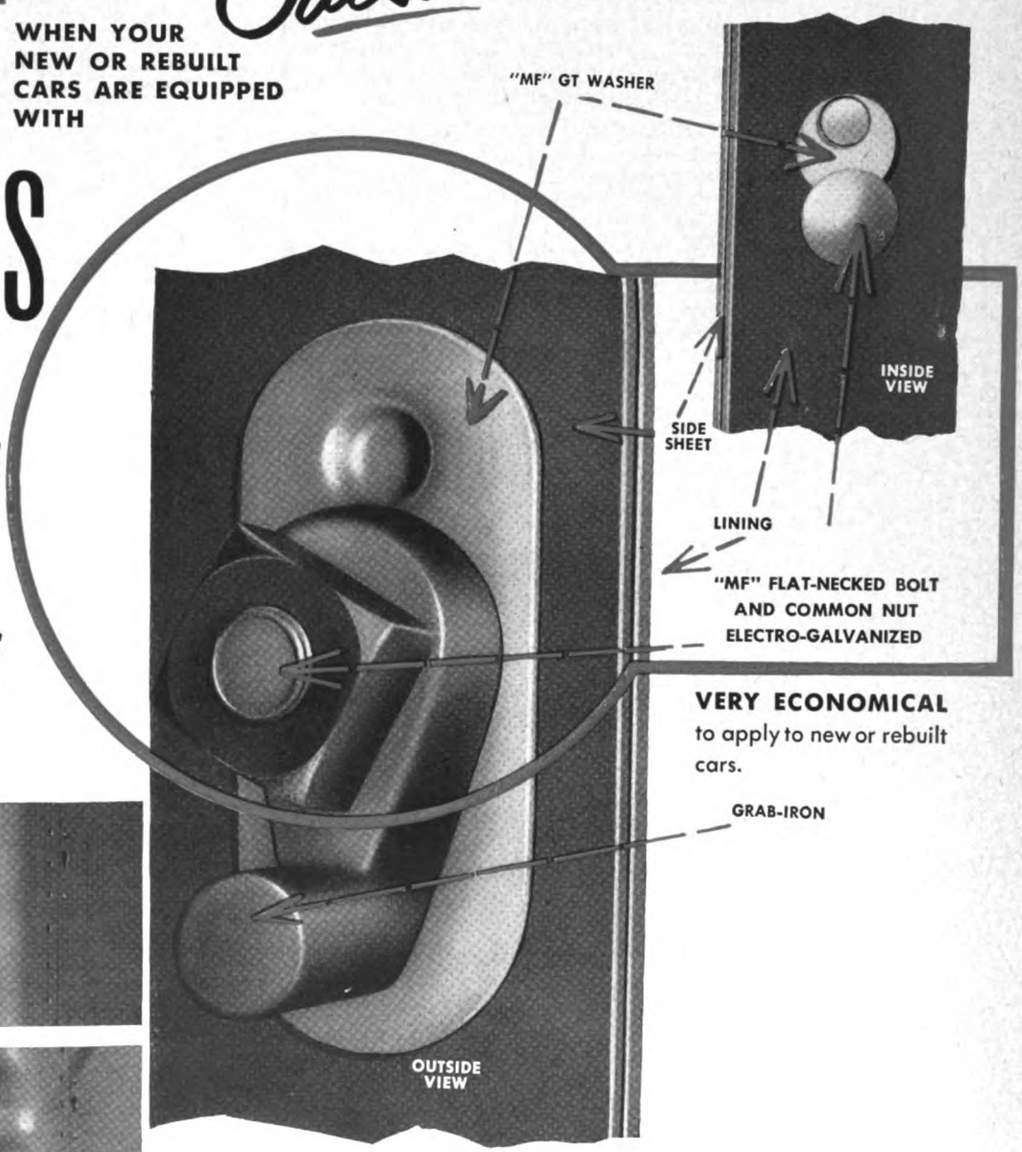
WHEN YOUR NEW OR REBUILT CARS ARE EQUIPPED WITH

ELECTRO-GALVANIZED

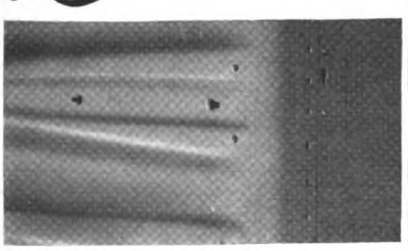
GT WASHERS

DON'T DISTURB THE *LINING*

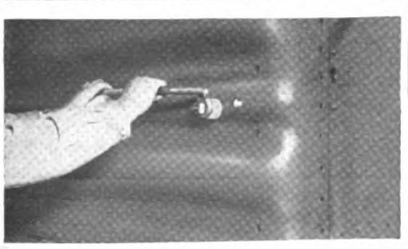
DON'T DISTURB THE *LADING*



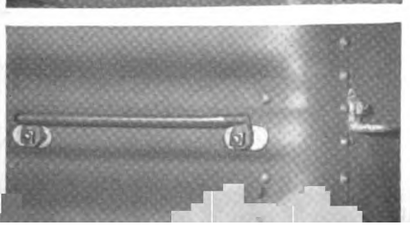
VERY ECONOMICAL to apply to new or rebuilt cars.



Keyhole slots punched in ends and side sheets. (Note flattened corrugation in end for use of washer.)



Grab-iron, with flat-neck bolt, nut and GT Washer are pre-assembled and inserted in keyhole slot.



When the flat-neck bolt is placed into position in the keyhole slot, the safety recession of the GT Washer drops into top of slot preventing the bolt-head from moving.

MacLean-Fogg LOCK NUT COMPANY

5535 N. Wolcott Street • Chicago 40, Illinois
In Canada: The Holden Co., Ltd., Montreal

How Metallizing saves money in railroad shops

"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scatches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

Some of the 28 major railroads using Metallizing:

A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

Metallizing Engineering Co., Inc.
1117 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain: Telephone: EDGEWOOD 4-1300
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

A Cut Above Average

A. Taper Bridge Reamer (Straight Flute)

B. Taper Bridge Reamer (Spiral Flute)

C. Car Reamer (Straight Flute)

High grade small tools perfected through years of specialization.

BRIDGE REAMERS
CAR REAMERS
MUD RING REAMERS
EXTENSION REAMERS
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LOCOMOTIVE REAMERS
HAND REAMERS
JOBBERS REAMERS
CHUCKING REAMERS
SHELL REAMERS
PIN REAMERS
DRILLS
RIVET SETS
SPECIAL REAMERS

WAYNE TOOL CO.
Waynesboro, Pa.
SMALL W TOOLS

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"This index is an editorial feature maintained for the convenience of readers. It is not a part of the advertiser's contract and Railway Locomotives & Cars assumes no responsibility for its correctness."

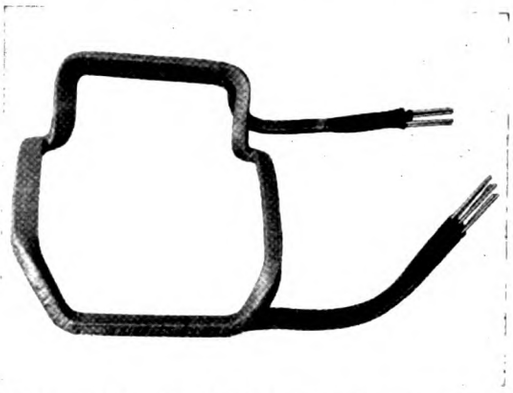
National Replacement Coils

Help Keep Vital Motors and Generators on the Job . . .

. . . IN THE ELECTRIC POWER INDUSTRY

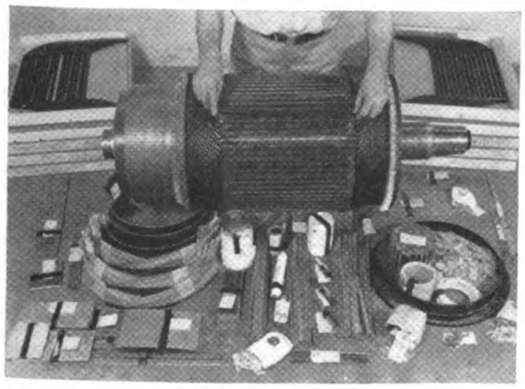
The photo shows part of a set of 54 stator coils for a large AC turbo generator. Rewinding equipment of this size is normally done on the job site. National can furnish the coils and send a full winding crew (or supervisory personnel with the customer supplying the labor), or National can supply the coils only (with the customer handling the complete installation).

. . . IN THE MINING INDUSTRY



Mines use National coils in the motors which power mine locomotives, shuttle cars, conveyors and other equipment. National "grew up" in the coal fields and really understands the electrical maintenance problems of the mining industry. The photo shows a typical armature coil for a mine locomotive motor.

. . . IN THE RAILROAD INDUSTRY



Some railroads send their traction motors to National shops for rewinding. Others perform the work in their own shops, using National replacement coils and winding supplies. The photo shows the variety of materials which go into a complete National rewinding kit for a traction motor armature.

. . . IN THE STEEL INDUSTRY

The steel industry depends on National for replacement coils because rugged, reliable National coils have proved their ability to meet the test of tough steel mill operating conditions. The photo shows armature coils for a DC mill motor being dipped in a silicone varnish to protect them against deterioration due to high temperatures.

When you need coils for any rotating electrical equipment, you can count on National for top quality, good service and a reasonable price. Ask your National field engineer for details on how National coils can help simplify your motor and generator maintenance problems. If you don't know him, just drop us a line and we'll arrange to have him get in touch with you.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A. TRADE MARK

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

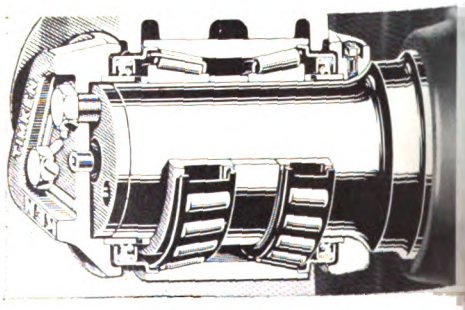
Number of "Roller Freight" cars up 43% in 15 months

6,671* "Roller Freight" cars—cars on Timken® roller bearings—have been placed in service or on order since February 1, 1956—an increase of 43%.

The total number of "Roller Freight" cars has soared to over 23,000*.

Nearly one-third of "Roller Freight" cars are in general interchange service, helping to lick the hot box problem on all railroads.

Today 61 railroads and private car owners are making the big switch to "Roller Freight". The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".



*as of May 1, 1957

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

Founded in 1832

SEP 1 8 1957

RAILWAY LOCOMOTIVES AND CARS

UNIVERSITY OF MICHIGAN
SEP 17 1957
TRANSPORTATION

SEPTEMBER 1957

A SIMMONS-BOARDMAN **TIME-SAVER** PUBLICATION

2 MINER

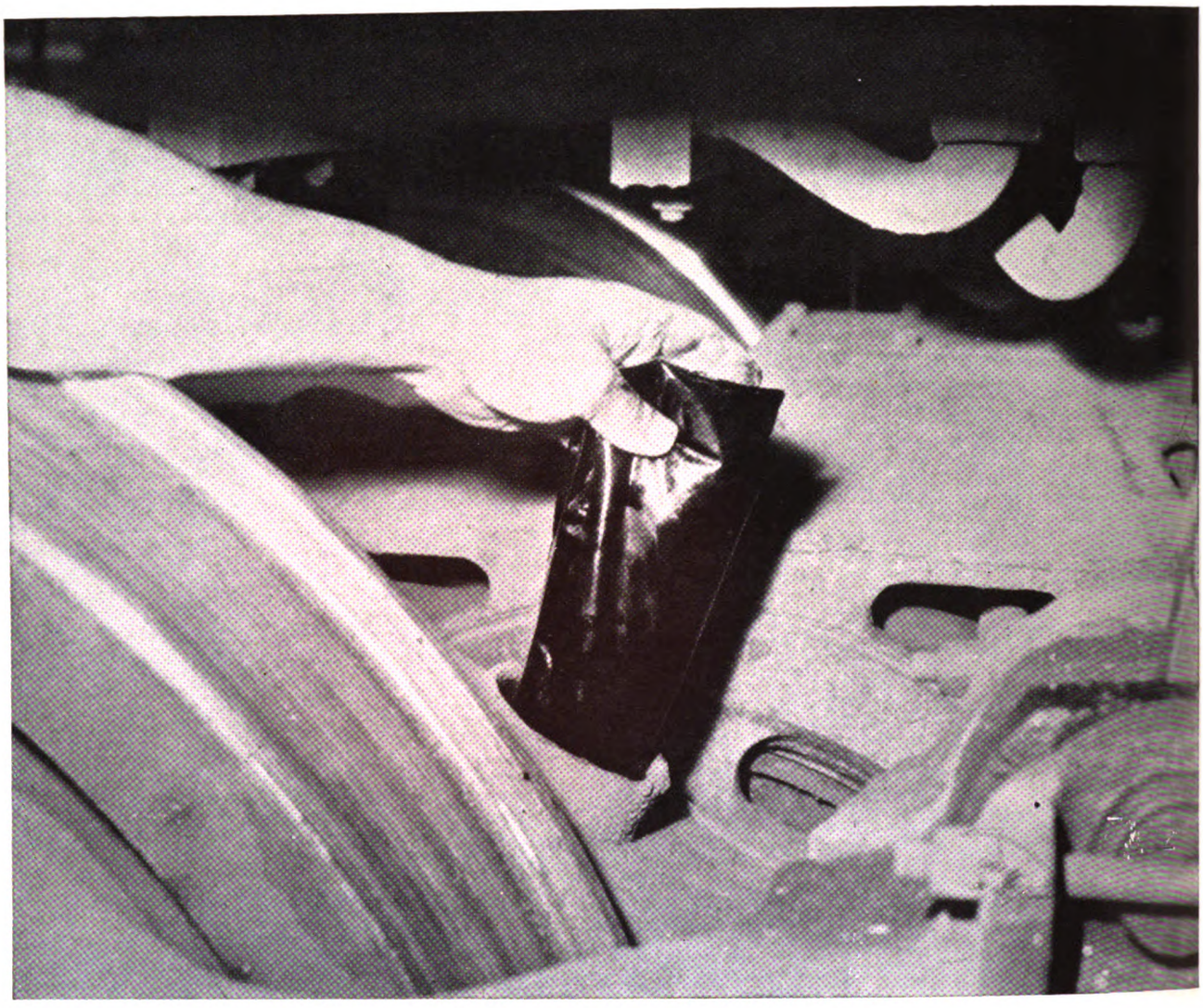
OUTSTANDING RECOMMENDATIONS FOR HIGH OPERATING EFFICIENCY

CLASS A-22-XL

CLASS RF-333

The Miner Class A-22-XL Friction Draft Gear and Miner Class RF-333 Rubber-Friction Draft Gear fulfill every requirement for efficient performance in freight train operation and are approved for unlimited application to cars in interchange.

W. H. MINER, INC. CHICAGO



It's "in the bag" for easy application

. . . Texaco Crater

Texaco Crater is now available in 1-lb. polyethylene bags —48 bags to the case—clean, convenient, economical. This is the same reliable product that has long been giving traction motor gears outstanding protection in all types of Diesel gear cases. But now—make-up servicing is so fast and easy—just drop in bag and all.

Time and again, comparative road tests have proven that Texaco Crater gives more miles per pound. Now, with in-the-bag application, over-all lubricating costs can be lowered, too—because in over-the-pit servicing, it's easy to control quantity, eliminate all waste, sharply reduce application time.

For full information, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis, or Atlanta. Or write:

☆ ☆ ☆

The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N.Y.

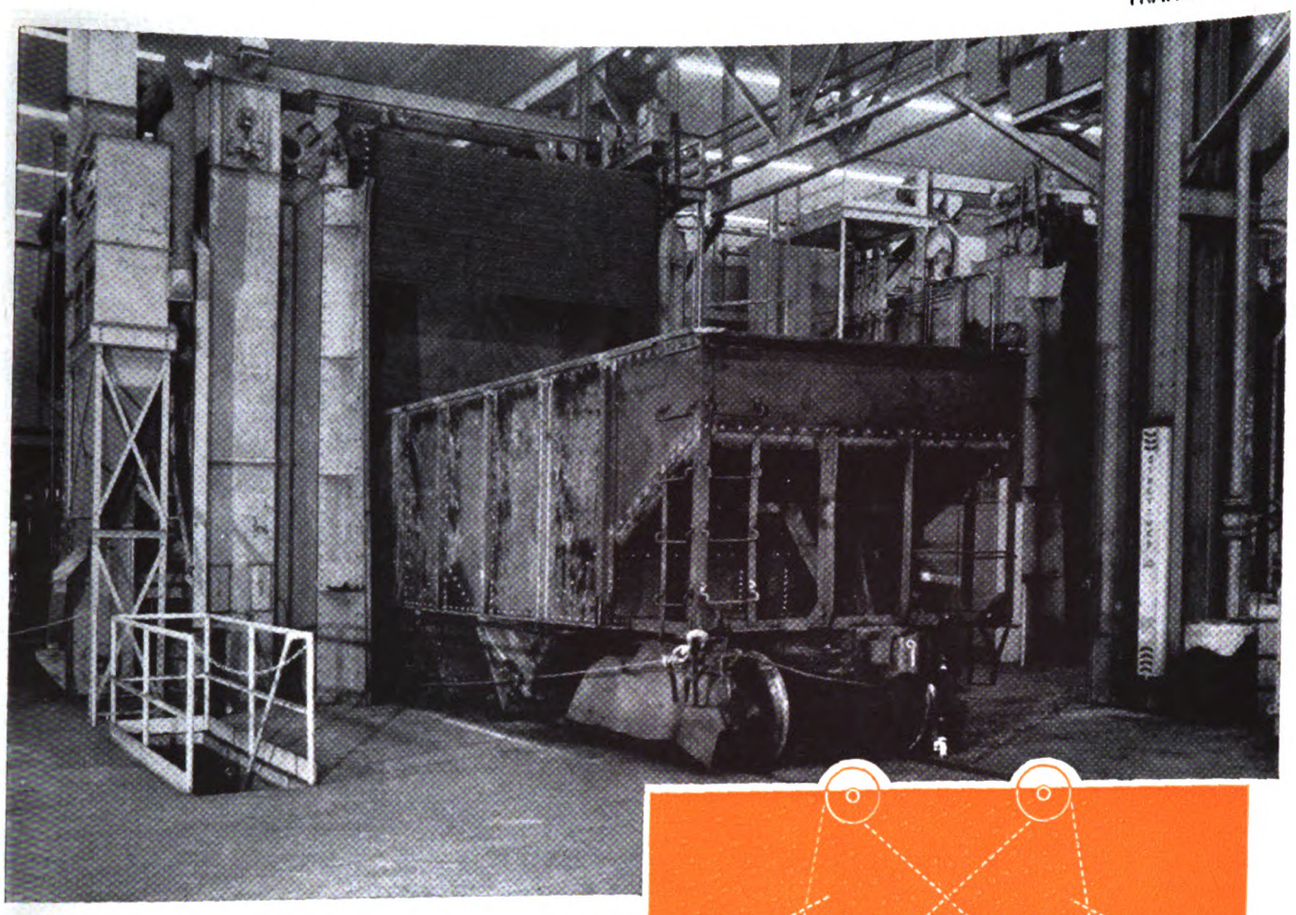
TEXACO

TEXACO Railroad Lubricants

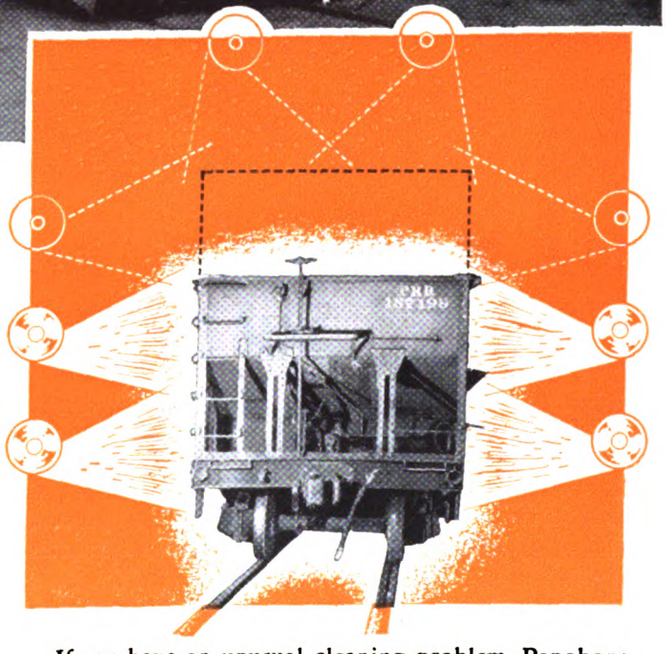
AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

SEP 17 '57
TRANSPORTATION



AUTOMATIC Pangborn Rotoblast cuts freight car cleaning time 85%!

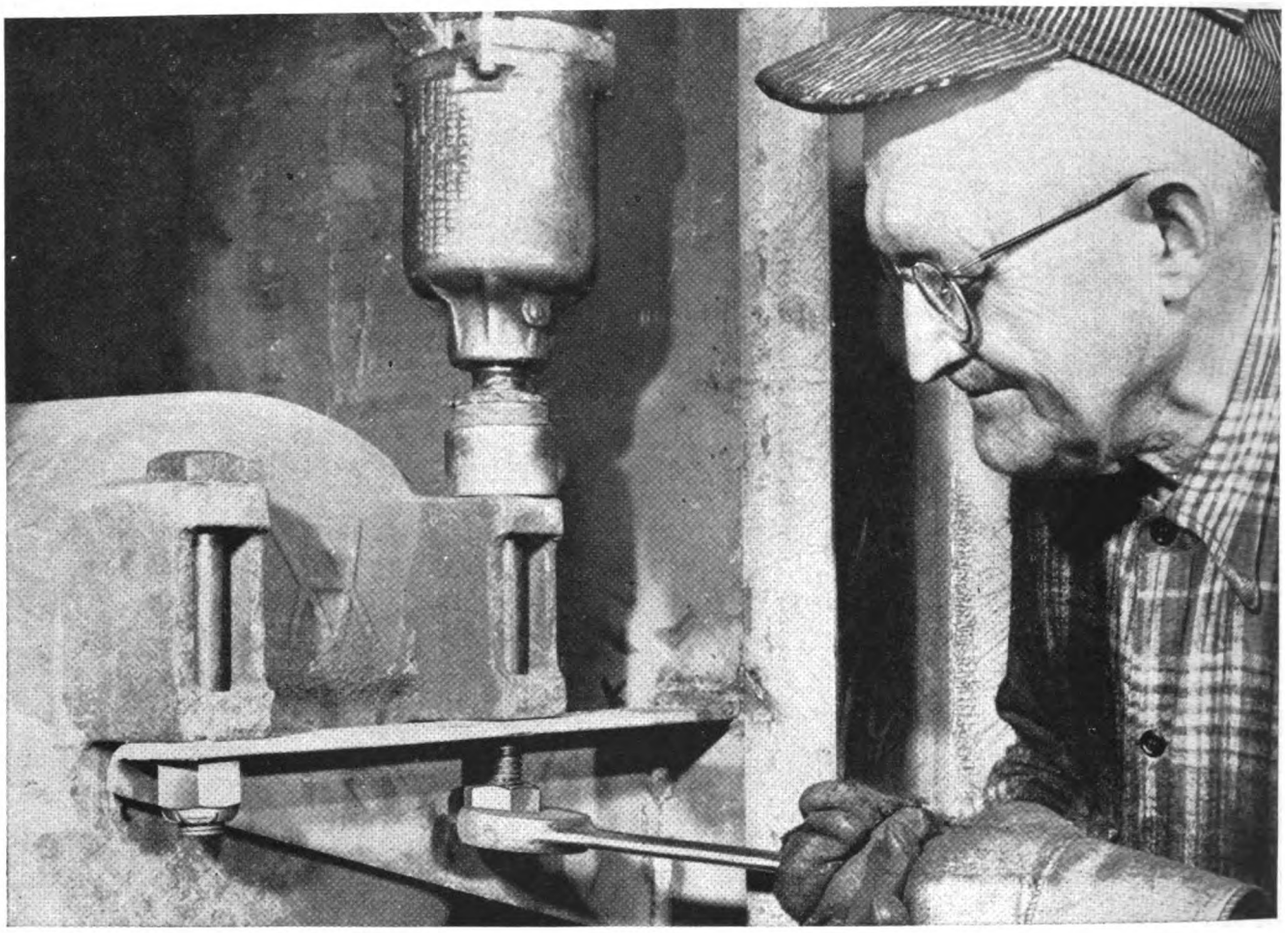


In the Pennsylvania RR's Samuel Rea Shop, Hollidaysburg, Pa., hopper cars and boxcars are Rotoblasted before painting and stenciling. With the equipment previously used for this job, five men each spent an average of 2.7 hours cleaning a typical 42-ft. hopper car. Today, using special Pangborn Rotoblast Rooms for the same job, the railroad has cut labor to *four* men per unit—and they *turn out four cars every hour!* In addition to cutting man-hours 85%, the quality of cleaning is far better than before.

If you have an unusual cleaning problem, Pangborn offers a special service. Pangborn engineers will study your problem and its relation to your production line. Then they will design a Rotoblasting machine for your particular needs. Find out now how Pangborn's engineering service can give you better cleaning and faster production at lower cost.

Write today for Bulletin 1210A to PANGBORN CORP., 3700 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn ROTOBLAST® cleans cheaper

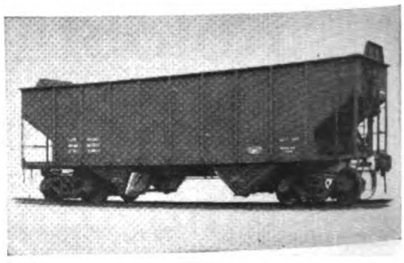


HOW TO ELIMINATE "BAD ORDER CAR" DOWN-TIME DUE TO FASTENER FAILURE

High speed freight hauling has emphasized the importance of such typical fastener "tough spots" as the AB valve and the brake cylinder and reservoir. This problem of costly fastener failures can become especially critical on specialized equipment such as hopper cars subjected to shaker service, which are continually in bad order due to loose air brake equipment.

The present tremendous effort to replace obsolete rolling stock with modern equipment designed and built to perform efficiently under the increasingly severe conditions imposed by modern traffic operations has focused attention on improved freight car design . . . and fastener requirements are included. As a contributing factor to reducing the number of "bad-order" cars and minimizing inspection and repair costs, leading American railroads are currently specifying the protection of Elastic Stop® nuts for all bolted applications in the vital areas.

For over 27 years American heavy industry has used vibration-proof Elastic Stop nuts on the "tough spots"



where ordinary fasteners perform unsatisfactorily due to severe shock loads, vibration and impact. Positive cost savings result from reduced inspection and fastener maintenance requirements. And only the red elastic locking collar protects internal bolt threads against corrosion!

For detailed information on preventive maintenance savings provided by vibration-proof Elastic Stop nut fastening methods on locomotives, passenger and freight cars, write Railway Sales Division, Dept. N89-928.

ESNA® TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road, Union, New Jersey

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

SEPTEMBER 1957 VOLUME 131, No. 9

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B&M RDC Engine Shop

EJ&E Box Car Shock Absorbers

"Cleveland Rapid" Car Shop

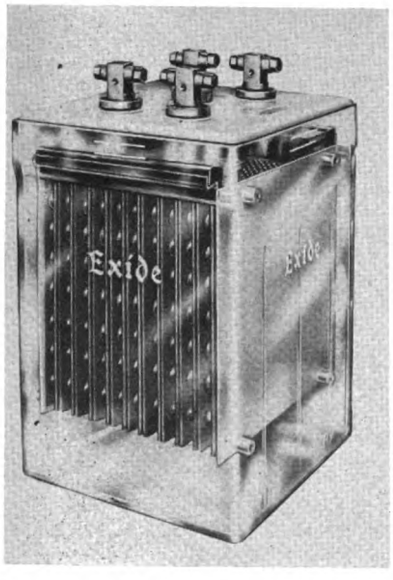
Products of Exhibitors—Allied Railway Supply Association

(Not previously described in Railway Locomotives and Cars)

Air Hose

This air hose is said to simplify replacement of brake, signal, sanding, and other air lines. Adaptable to both old and new installations, the air lines are available in sizes ⅝ in. through 1-½ in. and can be used in conjunction with existing equipment.

Also available are "Socketless" fittings for use on low pressure applications, featuring a push-on type fitting that requires no tools for assembly. The fittings are especially suited for electrical control cabinets and air brake gages. *Aeroquip Corporation, Dept. RLC, Jackson, Mich.*

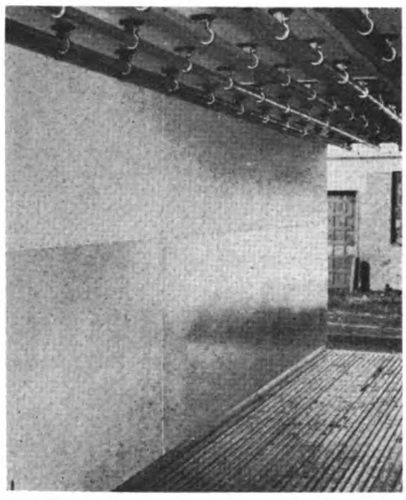


Plastic Jars for Stationary Batteries

Moulding of large plastic jars for stationary batteries has finally made it possible for one manufacturer to completely eliminate the use of glass jars for this purpose. Use of a strong, lightweight, heat-resistant polystyrene plastic jar has enabled the manufacturer to increase the rated capacity of its batteries, assure permanently leak-proof jar construction and substantially increase electrolyte volume.

The container, 14-½ in. by 13-$\frac{5}{32}$ in. by 19-⅝ in. deep, is used for the largest cells. The change from glass to plastic completes the conversion of stationary power units used in utility, telephone, railway, emergency lighting and industrial plant operations.

The batteries are rated from 415 to 1,173 amp-hr at the 8-hour discharge rate. Use of the plastic jars has made it possible to enlarge the plate size to gain up to 11 per cent in rated capacity. *The Electric Storage Battery Company, Dept. RLC, Box 8109, Philadelphia 1, Pa.*



Lining Panels

The Espey Carliner Panels are plywood, hardwood, or other materials coated by the manufacturer with a material having the same characteristics as the liquid Carliner. It is claimed to have good vapor seal, toughness and resistance to abrasion and impact. It is adapted for the interior of refrigerator cars, refrigerator trailers in piggy back service, interiors of covered hoppers, and for cars hauling grain and such commodities as flour and meat. *Spring Packing Corporation, Dept. RLC, 332 South Michigan ave., Chicago 4.*

Detergent Cleaner

Composition 72 is an alkaline detergent and is soluble in cold or hot water. It penetrates and saturates grease and oil. Once this material cuts between soil and surface, the soil is held suspended in the solution, to be flushed away by the follow-up rinse. Because of this free-rinsing action, it is claimed that surfaces dry streak-free. In addition to being clean, paint has a noticeable sheen to it. Recommended solutions of Composition 72 are within a pH range that assures safety to paint and lacquers. It contains no ingredients that give off odors that would be troublesome in confined areas.

Solutions may also be used heated to 140 deg F. Concentrations vary between 2 and 8 oz per gal of water, depending upon the method of application. These include automatic spray, foam spray method, and with bucket and brush. *Oakite Products, Inc., Dept. RLC, 19 Rector st., New York 6.*

Air Brake Components

The J-1 relay valve employs O-Rings and diaphragms which permit weight reduction and provide more sensitive and positive performance with simplified maintenance. It is designed for application to present B-3 relay valve brackets.

A high-capacity main reservoir safety valve, the Type H-1, is designed to operate over long periods under severe operating conditions. It employs many parts used in the D-24-B Feed Valve which simplifies stocking of maintenance parts. *Air Brake Division, Westinghouse Air Brake Company, Dept. RLC, Wilmerding, Pa.*

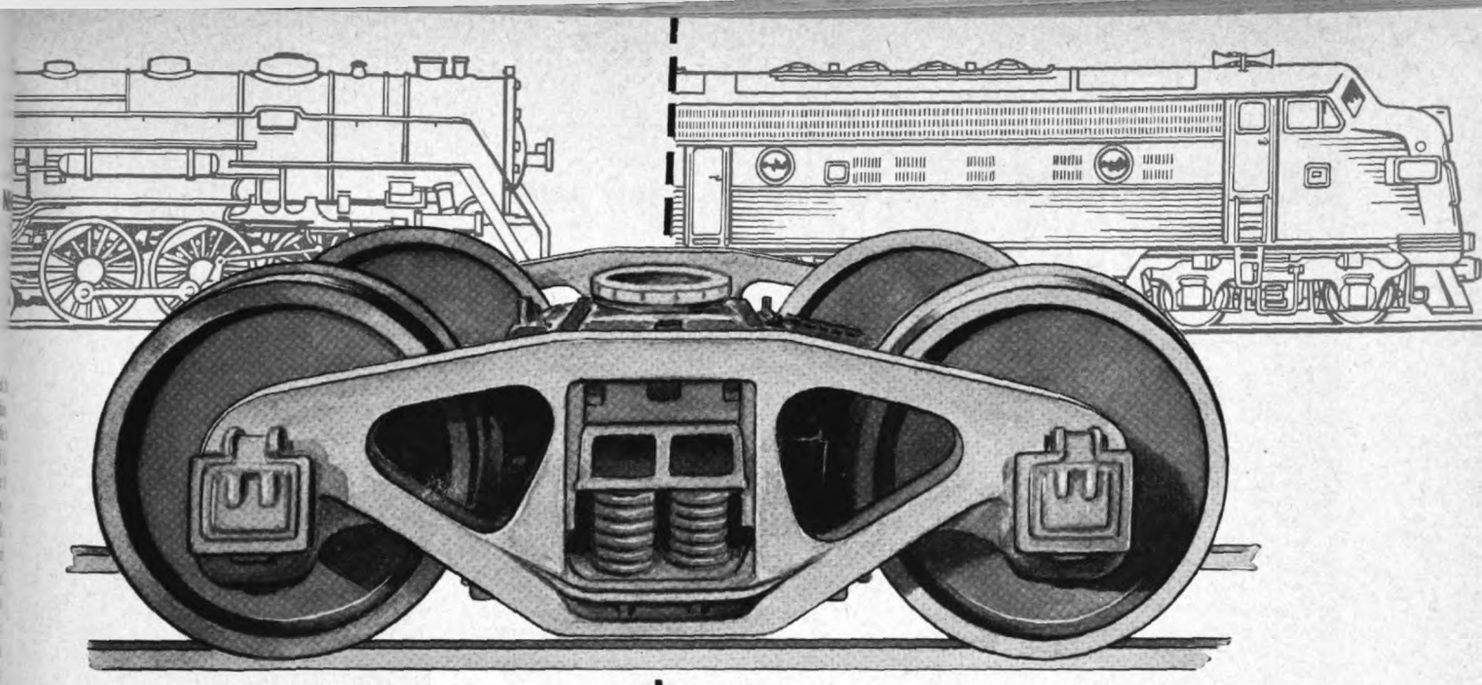
Diesel Servicing Truck

This truck carries fuel oil, lube oil and sand to yard locations. It is reported that the driver, who also operates the unit, can completely service a switcher in about twenty minutes.

The capacity of the unit, which is mounted on a standard chassis equipped with power steering, is one cubic yard of sand, 1,600 gallons of fuel oil and 25 gallons of lube oil in five gallon cans.

The fuel tank is equipped with a pumping unit driven by the truck engine. Fifty feet of fueling hose is supplied

(Continued on page 8)



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from waste to → JBS

Great Step Forward!

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ubrication, the change-over to a better type of
cator raises certain questions: what type
ld it be; what qualities should it possess; what
of a performance should be expected of it?
elp you decide, consider what the JBS Acme
icator offers and compare it with any other
cator. JBS Acme alone has the exclusive all-
quilted core* which retains many times its
weight in oil reserve. Heavy chenille loop pile
ces assure an ample supply of filtered oil at
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Acme Lubricators require no modification of
standard journal box, are designed to hold
position in the box, and assure better per-
ance with less servicing.

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Information and Folder

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*Patent applied for

JBS ACME JOURNAL LUBRICATORS

★ Retains oil up to 4 times its own weight
★ Requires no modification of journal box
★ Wicks AAR specification car oil even in coldest weather
★ Assures better performance with less servicing
★ Has exclusive all-wool quilted core*
★ Reinforced for extra wear
★ Cannot glaze
★ Readily reclaimed

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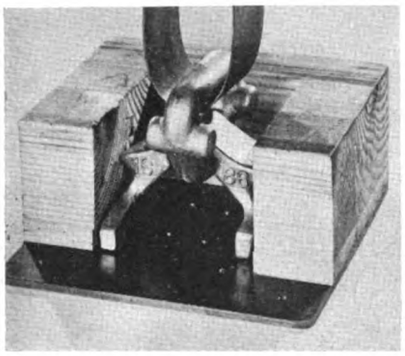
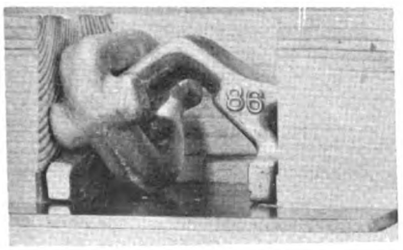
(*Continued from page 6*)

with hose reel mounted for easy access and withdrawal. Accurate record of fuel oil supply to each locomotive is provided by a meter. The sand tank has a hose connection for coupling to locomotive air line which furnishes pressure to blow the sand into sand boxes. Sufficient hose is available to service boxes in all locations without moving the truck.

The manufacturer prefers that the railroad specify its own chassis for the truck. On this will be installed any combination of equipment for fuel oil, sand, or other servicing desired. *Farrell Manufacturing Company, Dept. RLC, Joliet, Ill.*





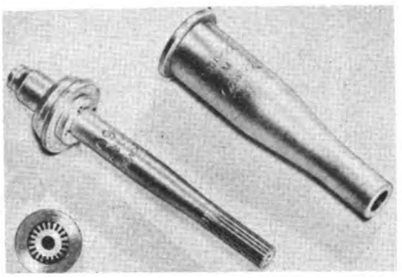
Flat Car Anchor

A new retractable hold-down anchor is said to feature a minimum size pocket required in decking and an anchor link, when retracted, which does not lie at bottom and become embedded in cinders, ice, snow or other foreign matter.

The anchor fulchrum is welded to the underframe, and it is said the full swivel action of the link provides maximum angularity for load attachment. The link will take standard 2-in. strapping or cable. *MacLean-Fogg Lock Nut Company, Dept. RLC, 5535 North Wolcott ave., Chicago 40.*

Cutting Nozzles

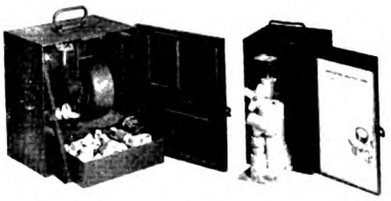
Increased flame cutting speeds are said to be possible with this line of Oxweld two-piece nozzles. Designed for flame



cutting with oxygen and fuel gases, each has from 12 to 20 extremely small outlets for preheat gases to increase heat transfer and produce a nearly solid ring of preheat flame. This is said to be ideal for shape cutting because of the uniform preheat regardless of the direction of the cut.

A divergent bore design boosts gas speed to 1,200 ft per sec to increase cutting speeds. Each two-piece nozzle consists of a brass internal section with finely grooved slots for preheat gases, and a heat-resistant copper cover. Only the external or internal section needs to be replaced.

Two-piece construction makes cleaning easier and eliminates the need for cleaning wires or special tools. Nozzles are available for general duty cutting, scrap cutting, and high speed machine cutting. *Linde Company, Division of Union Carbide Corporation, Dept. RLC, 30 East 2nd st., New York 17.*



Diesel Nozzle Tester

Utilizing the basic fundamentals of a standard hydraulic jack, this precision instrument can be used for the testing of diesel engine nozzles and injectors. Rugged and simple in construction, any mechanic can follow the printed instructions for measuring injector opening pressures, checking spray patterns for uniformity and detecting other fuel-consuming or power-robbing conditions. The unit is easily carried within the shop or to road and field service calls.

A hydraulic pressure gauge, 3-11/16 in. dial, 3000 psi capacity with 100 lb graduations, is standard equipment. Gauges of 5000, 7500, and 10,000 psi capacity are also available. The basic unit can be adapted to test valves, castings, controls, brakes, radial gasoline engine injectors, presses as well as other compact hydraulic systems. *Western Railroad Supply Company, Dept. RLC, 2428 South Ashland ave., Chicago 8.*

Hollow Weld Rod

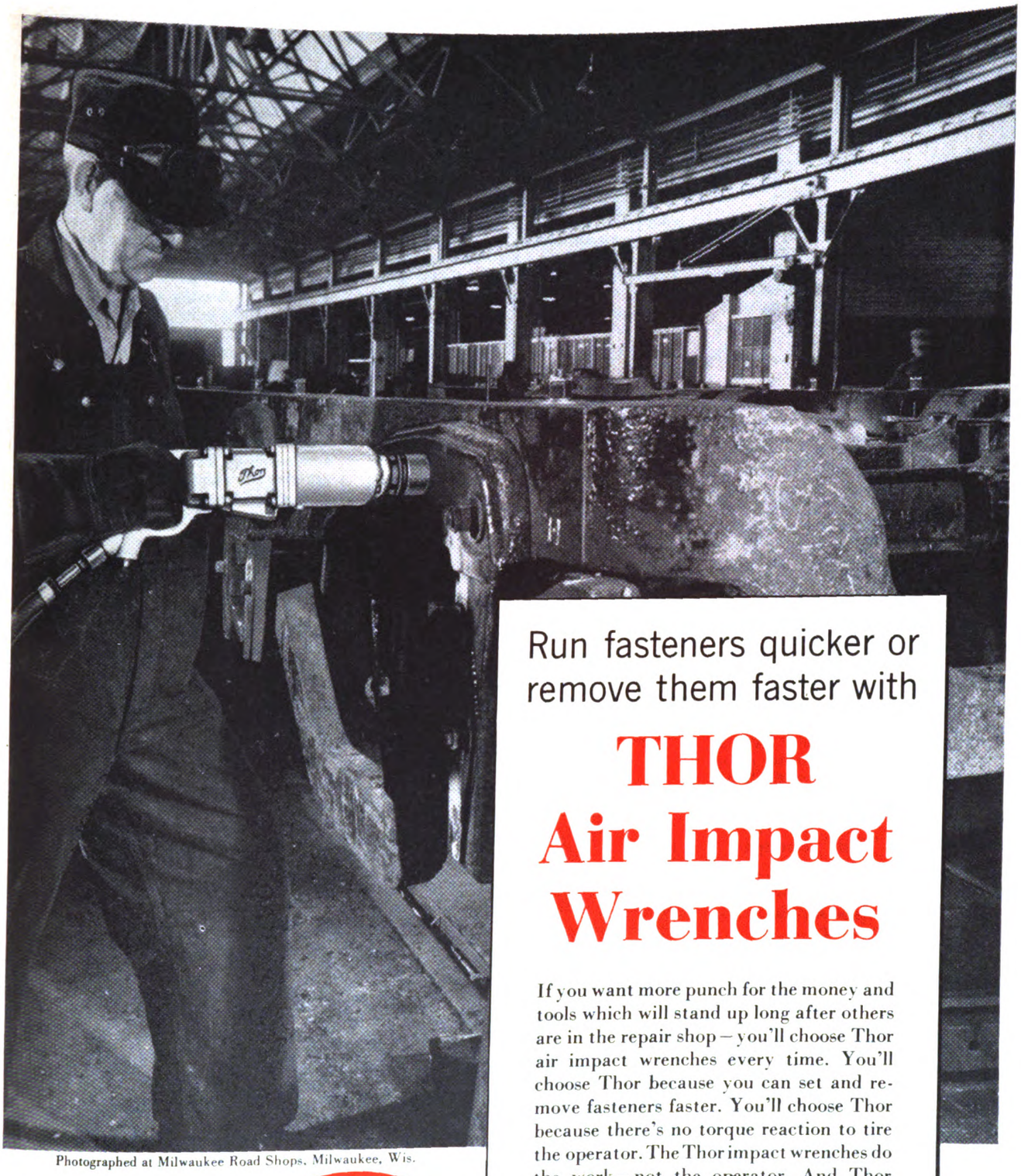
A hollow wire welding rod which carries its own flux in its center is said to speed such specialized welding chores as hard-facing. The rod, designed for use in the manufacturer's own equipment, is supplied in spools for quick insertion. Reportedly, the weld metal, fed through the specially designed nozzle, can be laid down with far greater speed than with the fastest manual rods.

Its circular cross-section affords maximum resistance to bending or kinking as it is driven through a flexible shaft to the nozzle end. Two types of rod are produced. S/A manganese wire coils for steel buildup and repair work, and S/A 53 for hard-facing to resist wear and impact. *American Brake Shoe Company, Amsco Division, Dept. RLC, 230 Park ave., New York 17.*

Freight Car Truck

The Holland Ride-Ease truck, Style RE-2, has built-in bolster spring control. The friction system incorporated in this truck follows the same basic principle of direct acting, axially-loaded friction members employed in this manufacturer's ride stabilizer unit RS-1. The system is said to eliminate destructive friction

(*Continued on page 78*)



Photographed at Milwaukee Road Shops, Milwaukee, Wis.

Run fasteners quicker or remove them faster with

THOR Air Impact Wrenches

If you want more punch for the money and tools which will stand up long after others are in the repair shop – you'll choose Thor air impact wrenches every time. You'll choose Thor because you can set and remove fasteners faster. You'll choose Thor because there's no torque reaction to tire the operator. The Thor impact wrenches do the work – not the operator. And Thor gives you the widest selection of tools – 1/4" to 1 1/4" bolt capacities – a variety of angle attachments and accessories.

Get Thor impact wrenches on the job today – watch your costs go down tomorrow. Call your Thor factory representative for a demonstration. Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

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Thor
PORTABLE POWER
TOOLS

Loomis Becomes AAR President

Daniel P. Loomis, chairman of the Association of Western Railways, has been elected president of the Association of American Railroads, succeeding W. T. Faricy, who has been elected chairman of the board. Mr. Loomis, as president, will serve as chief administrative officer.

Billing Repair Cards Simplified

The AAR calls atention to Circulars DV-1399 and 1399-A, approved at the 1957 annual meeting, which cover recommendations on simplified procedures to reduce cost of billing for car repairs. Many of these rule changes will appear in the next supplement to the Interchange Rules to become effective August 1, 1957.

On page 85 of Circular DV-1399, the new wheel and axle billing form is shown. Pending receipt of the new forms, the present forms can still be used by inserting only the information required by the new form and eliminating the remainder. Rule 96 changes as shown on pages 60 and 61 of Circular DV-1399, eliminate certain requirements for pricing billing repair cards under group billing.

Rubber Draft Gear Damage

The AAR advises that consignees are not always careful in controlling application of heat to hopper cars in freezing weather to remove lading.

As a result of fires underneath cars, cases have been reported of rubber draft gears heated to the extent that the rubber portion has been badly damaged and no longer in condition to absorb shocks due to coupling impacts.

The AAR will appreciate the help of member roads and private car owners if they will advise all their people—concerned with cars that must be thawed to unload the lading, the consignees, and other interested parties, to avoid heat in the area of the draft gear. Other portions of the car should receive consideration also, since damage can result to journal bearings and air brake equipment if proper care is not provided.

Brake Law Amendments Trigger AAR Rule Revisions

Legislation which would give the Interstate Commerce Commission authority to prescribe rules for power or train brakes has been considerably changed. On July 1, 1957, the Senate Committee on Interstate and Foreign Commerce reported senate bill 1386 favorably, with two significant amendments.

The first of these requires the ICC to adopt and put into effect as rules for power or train brakes, the so-called Red Book rules of the AAR "with such provisions as may have been adopted prior to the enactment" of the amendatory bill. This was in lieu of the original provision that would have required the Commission to prescribe such rules after hearing (Railway Locomotives and Cars, May 1957, page 52). The report on the bill stated that "the railroads are expected, in making revisions in the rules, to exercise prudence and sound judgment" and further stated "the Committee has confidence in the railroad's willingness to revise the rules on a basis that will serve the public interest."

The second amendment was the addition of a proviso that states, "Provided, however, that such rules or standards or instructions or changes made therein shall be promulgated solely for the purpose of achieving safety." The statement on this point is also significant. The report states:

"The fear has been expressed that the rules and regulations for power brakes authorized by S 1386 might be used to limit train length for economic rather than safety reasons. Such is not the intent of the bill. Its terms are to be administered, if they become law, to achieve safety and for no other purpose."

In considering this problem, the

(*Continued on page 14*)

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE AUGUST ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and builder	*No. of units*	*Horse-power*	*Service*	*Other detail*
CANADIAN NATIONAL:				
General Motors Diesel	17	—	Passenger	———
	80	—	Road switchers	———
	19	—	Yard switchers	———
Montreal Locomotive Works	30	1,800	Road switchers	———
Electro-Motive	2	—	Road switchers	For Central Vermont.
Alco Products	2	—	Yard switchers	For Grand Trunk Western

FREIGHT-CAR ORDERS

Road and builder	*No. of cars*	*Type of car*	*Cap., tons*	*Other detail*
AMERICAN REFRIGERATOR TRANSIT CO.:				
Pacific Car & Foundry	50	Mechanical refrig.	70	Estimated unit cost, $26,500.
	150	Insulated	70	Equipped with DF loaders. Estimated unit cost, $16,500. Delivery of 200 cars scheduled for first quarter 1958.
BALTIMORE & OHIO:				
Pullman-Standard	300	Gondola	70	———
	25	Covered hopper	70	———
CENTRAL OF GEORGIA:				
American Car & Fdry.	500	Triple hopper	70	Cost, $4,150,000. Being delivered at rate of 25 cars per day.
CHICAGO, ROCK ISLAND & PACIFIC:				
Pullman-Standard	400	Gondola	70	———
	150	Box	50	100 with 15-ft doors; 50 with 12-ft doors. Delivery of 550 cars scheduled for first quarter 1958.
MINNEAPOLIS, ST. PAUL & SAULT STE MARIE:				
Pullman-Standard	75	Covered hopper	70	For September and December delivery
NORFOLK SOUTHERN:				
Bethlehem Steel	30	Hopper	70	Unit cost, $8,700. For December delivery.
NORTHERN PACIFIC:				
Company shops	450	Box	—	50-ft double-door.
	50	Insulated box	—	With DF loaders.
WESTERN MARYLAND:				
Bethlehem Steel	500	Hopper	70	Delivery of 550 cars to begin in
Greenville Steel Car	50	Gondola	70	January.
WESTERN PACIFIC:				
Pullman-Standard	30	PS-2 covered hopper	—	2,003 cu ft cap. Unit cost, $8,930.
	10	PS-2 covered hopper	—	2,893 cu ft cap. Unit cost $10,600. Delivery of 40 cars expected first quarter 1958.

PASSENGER-CAR ORDERS

Road and builder	*No. of cars*	*Type of car*	*Other detail*
BALTIMORE & OHIO:			
Budd Co.	2	"Siesta coaches"	Delivery scheduled for early 1958.
CANADIAN NATIONAL:			
Budd Co.	1	RDC-3	Cost of 2 cars, $360,000. Delivered in
	1	RDC-2	August.

NOTES

FREIGHT CARS:

Northern Pacific—Converting 25 box cars into flat cars for piggyback service. Estimated cost of conversion, being done in company shops, $1,600 per car.

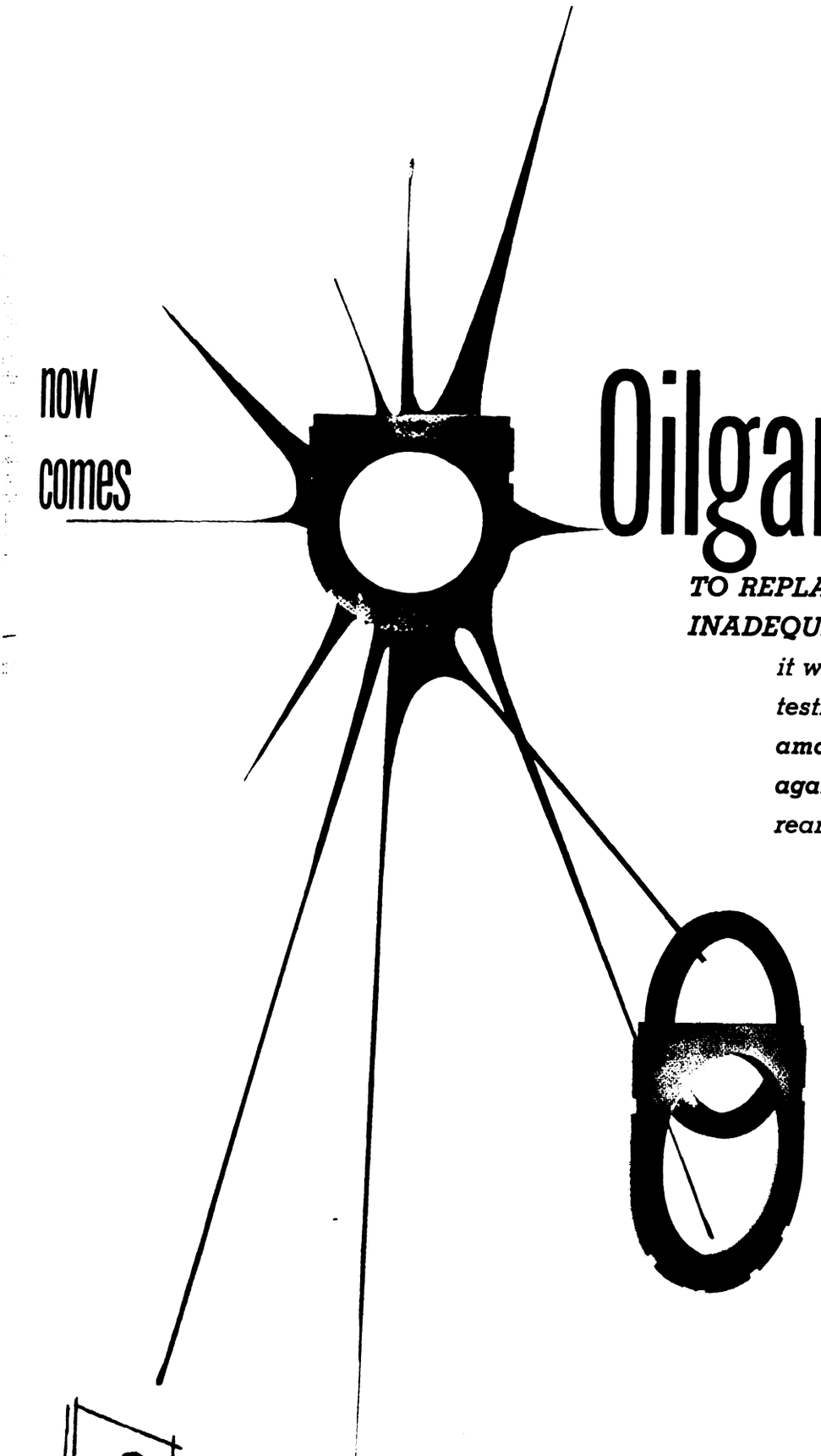
Virginian—Ordered materials for construction in company shops of 500 70-ton hopper cars during second quarter of 1958.

now comes

Oilgard

TO REPLACE THE CONVENTIONAL INADEQUATE DUST GUARD

it was found after appropriate testing that OILGARD is an ***amazingly effective prevention against the loss of oil from the*** *rear of journal boxes.*



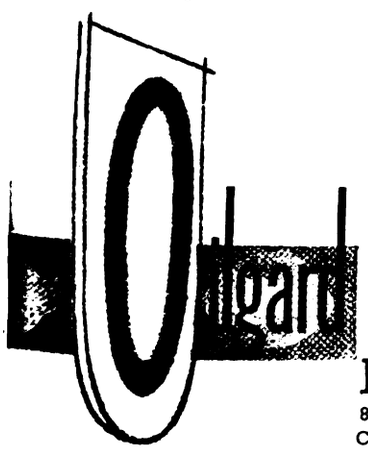
"The inner ring floats with each movement of the axle and thereby eliminates the wear and crushing damage which ordinarily occurs with conventional designs of dust guards."

Holds the free oil in the journal box by establishing a retainer at the dust guard seat on the axle. It consists of a sheet metal frame which houses a plastic ring—an EFFECTIVE fit in the housing and on the axle.

The material used in the ring is not affected by oil or the temperatures involved, Oilgard is based on AAR Drawing No. SK-9855.

Don't fight the axle—fight the oil!

Oilgard's effectiveness is due to the fact that it doesn't resist the axle movement. The ring floats with the axle, but maintains a constant oil-stop contact within the metal frame.



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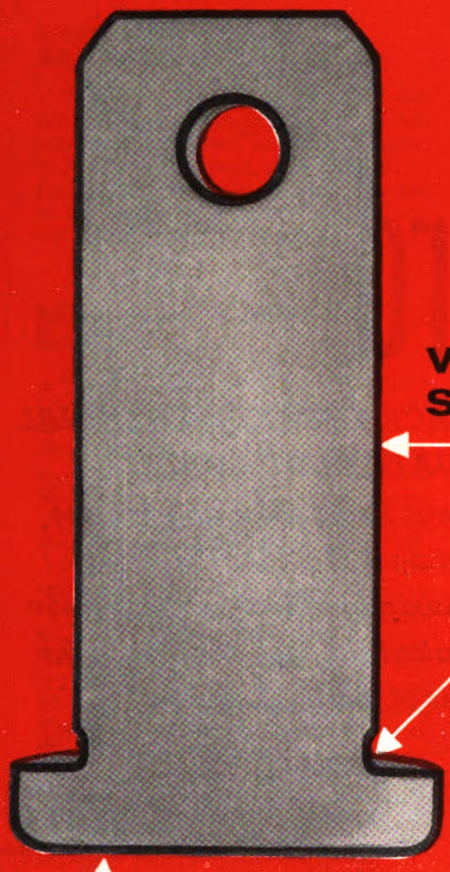

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HARDENED FILLET

HARD, BRITTLE HEAD

Commercial Bushing

ELECTRO-MOTIVE QUA

1/8" WEARING SURFACE

FILLET NOT HARDENED

TOUGH, DUCTILE HE

Electro-Motive Bushing
double the wearing

Longer lasting . . . cost no more!

Why Electro-Motive Pins and Bushings cut replacements costs

Compare the photographs at left and you will see why Electro-Motive Pins and Bushings—on depth of wearing surface alone—will give you much longer service life.

Note on the Electro-Motive Pin the wear-resistant surface runs only on the shank. This is purposely done because a pin must perform two functions: provide a bearing surface for the bushing and withstand severe shocks both from installation and service.

Thus, on the Electro-Motive Pin, the shank has a hard, deep bearing area while the head and threads are left ductile for better shock absorbing qualities, longer life.

Make a comparison in your own shops. Ask your Electro-Motive representative for a sampling of EMD Pins and Bushings for inspection and testing. You will see why the special hardening process employed in the manufacture of these parts brings extra service and savings at no extra cost.

Induction hardening makes the difference. In the induction hardening process, pins are passed through a high amperage electric induction coil which quickly heats them to optimum temperature. Water spray quickly quenches to eliminate distortion and scale.

Fast delivery from nine on-line warehouses. All nine of our warehouses carry stock of these pins and bushings in both current and fast-moving classifications.

La Grange, Illinois
Jacksonville, Fla.
Minneapolis, Minn.
North Salt Lake City, Utah
Los Angeles, Calif.
Halethorpe, Md.
Robertson, Mo.
Ft. Worth, Texas
Emeryville, Calif.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS
HOME OF THE DIESEL LOCOMOTIVE
In Canada: General Motors Diesel, Ltd., London, Ontario

NEWS

(*Continued from page 10*)

general commit.ee noted the fact that under this bill changes in the rules for power and train brakes may be changed, after hearing, by the ICC. In connection with authority to make changes in the rules, there is the following significant statement in the report, "In making such future changes, the committee wishes to make it clear that the Commission should confer with and heed the advice of the AAR."

While action on S. 1386 and identical H.R. 5124 was pending before Congress, representatives of the AAR, committee on safety appliances and committee on brakes and brake equipment were conferring with representatives of the Bureau of Safety and Service of the ICC to prepare a revision of the Red Book that would be mutually acceptable.

As a result, a revised set of rules was referred to the General Committee of the Mechanical Division of the AAR for review, and were approved on July 24, 1957. The complete details of the revision have been submitted to letter ballot vote of the member roads.

Miscellaneous Publications

SERVICE MANUAL ON SPRAY EQUIPMENT. 405-page manual contains full parts list and general information on installation, operation and maintenance of DeVilbiss spray equipment. Replacement sheets to be available when requested, and new volume to be issued when necessary. *DeVilbiss Company, Toledo 1, Ohio.* Price, $2.50.

Personal Mention

Atchison, Topeka & Santa Fe.—Territory of W. W. LYONS, master mechanic, Colorado division, *La Junta, Colo.*, temporarily extended to include entire Western division, succeeding L. B. JOHNSON, appointed acting master mechanic, Plains division, *Amarillo, Tex*, succeeding J. T. SMITH on leave of absence. Mr. Johnson continues as master mechanic of the Panhandle division at *Wellington, Kan.*

Baltimore & Ohio.—W. T. MCCAHILL appointed road foreman of engines at *Grafton, W. Va.*

Belt of Chicago.—*Clearing, Ill.*: EMMETT C. HARVEY, superintendent, appointed general superintendent, with jurisdiction including locomotive and car departments.

Canadian Pacific.—*Montreal*: D. F. HANEY, assistant engineer of diesel equipment, appointed engineer of standards and methods, and B. B. WOODLAND, divi-

(*Turn to page 106*)

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
May, 1953	3,013,611	5,892	11,433	17,325	173,945
May, 1954	2,713,511	4,416	6,510	10,926	248,353
1955					
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425
1957					
January	2,767,060	3,373	6,121	9,494	291,453
February	2,675,265	3,272	6,844	10,113	264,538
March	3,027,280	3,164	6,687	9,851	307,306
April	2,832,406	3,949	8,447	12,396	228,493
May	2,975,199	6,580	12,691	19,271	154,387

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of May		5 months ended with May	
		1957	1956	1957	1956
3	Road locomotive miles (000) (M-211):				
3—06	Total, Diesel-electric	37,868	38,686	183,689	186,599
3—07	Total, electric	687	772	3,510	3,669
3—04	Total, locomotive-miles	40,863	43,586	199,755	211,953
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1,678	1,744	8,060	8,459
4—06	Empty, total	990	985	4,752	4,685
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—03	Total in Diesel-electric locomotive trains	113,646	112,506	539,553	535,379
6—04	Total in electric locomotive trains	2,220	2,457	10,902	11,214
6—06	Total in all trains	123,644	127,076	588,633	607,039
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	43.8	43.0	43.0	42.9
10—03	Empty freight car-miles	25.9	24.3	25.4	23.7
10—04	Total freight car-miles (excluding caboose)	69.7	67.3	68.4	66.6
10—05	Gross ton-miles (excluding locomotive and tender)	3,228	3,132	3,145	3,077
10—06	Net ton-miles	1,478	1,445	1,429	1,410
12	Net ton-miles per loaded car-mile (M-211)	33.7	33.6	33.2	32.9
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	62.9	63.9	62.9	64.4
14	Averages per train hour (M-211):				
14—01	Train miles	18.8	18.6	18.9	18.7
14—02	Gross ton-miles (excluding locomotive and tender)	60,200	57,493	58,840	56,869
14	Miles per diesel-electric unit day (M-240):				
14—01	Road freight units	212.3		212.6	
14—02	Road Passenger units	426.5		437.8	
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	46.8	47.9	46.0	47.0
17—02	All	44.9	46.1	44.2	45.2
18	Average net ton-miles per freight car-day (M-240)	952	990	923	957
19	Per cent of home cars of total freight cars on the line (M-240)	110.6	111.9	111.0	112.1

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—06	Diesel-electric	19,591	20,315	97,027	101,372
3—07	Electric	1,156	1,239	5,943	6,405
3—04	Total	21,022	22,269	104,546	111,852
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	211,865	226,072	1,063,545	1,144,403
4—11	Total in Diesel-electric locomotive trains	196,156	205,648	979,615	1,035,029
12	Total car-miles per train-mile:	9.57	9.72	9.67	9.81

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,860,765	3,930,076	18,997,228	19,299,826
1—06	Total	4,024,287	4,224,870	19,850,337	20,715,958
2	Passenger yard switching hours				
2—03	Diesel-electric[1]	243,416	251,481	1,215,204	1,241,175
2—06	Total	271,951	285,498	1,358,858	1,416,773
3	Hours per yard locomotive-day:				
3—02	Diesel-electric	15.3	16.1	15.5	16.1
3—05	Serviceable	15.5	16.0	15.7	16.0
3—06	All locomotives (serviceable, unserviceable and stored)	14.3	14.6	14.4	14.4
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.66	1.68	1.70	1.69
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.79	.78	.79	.76

[1] Excludes B and trailing A units

Visit National's Headquarters, House on the Roof, Hotel Sherman

BE SURE TO SEE

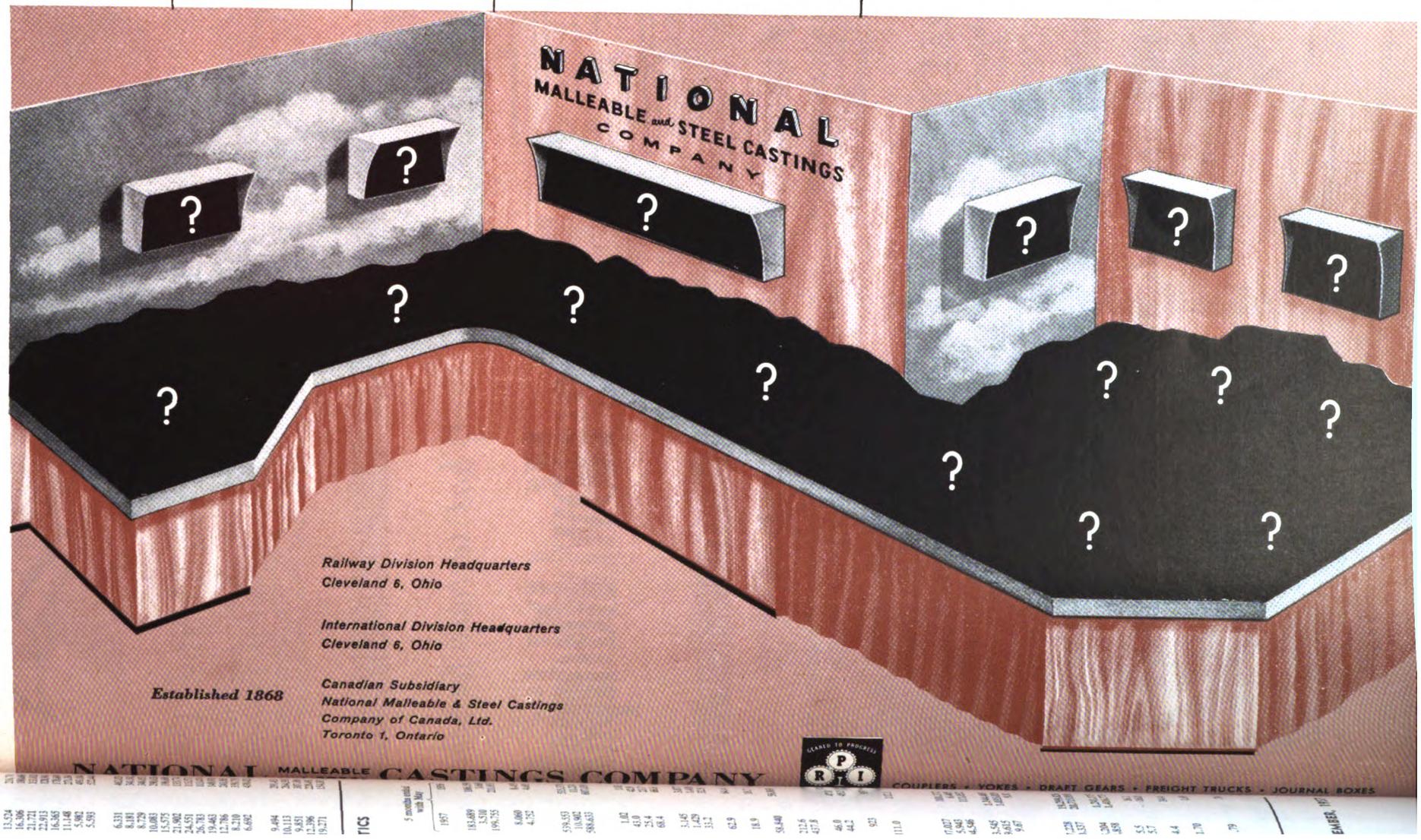
the NATIONAL exhibit

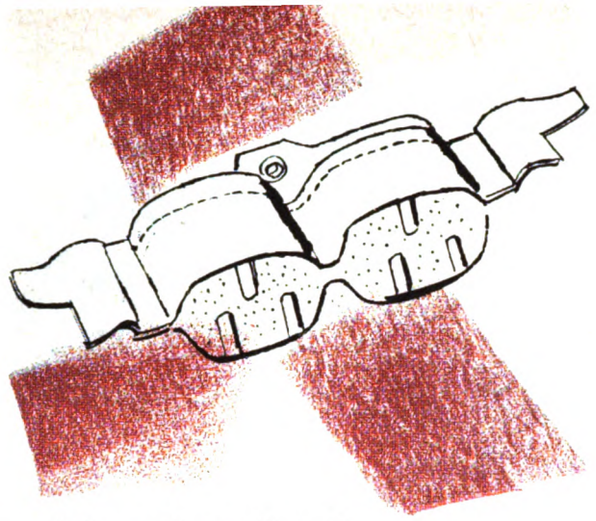
BOOTHS 161 · 162

Allied Railway Supply Association Convention

SEPTEMBER 16 17 18

HOTEL SHERMAN, CHICAGO





Is it simple?

Almost invariably, good design is simple design. Redipak Twin lubricating pads have no moving parts, no metal springs, no complicated gadgetry to wear out or break up. Just two simple foam neoprene cores encased in a sturdy cotton wicking cover.

Is it easy to install?

Does the proposed journal box lubricator take a trained engineer, a husky car-knocker, a twenty-ton jack and special tools for installation? Or can it be easily inserted, by any yard man, without tools? Redipak Twin lubricating pads can.

Is it thoroughly tested?

Redipak Twin lubricating pads have been rigorously tested and proven in one of the world's most modern journal bearing laboratories. Thousands of miles of road service are bearing out the accuracy of our testing.

Is it economical?

Due to their simplicity, Redipak Twin pads are inherently economical. Their greatest economy, of course, lies in their year-after-year savings in maintenance expenses.

What to look for when

See How Redipak

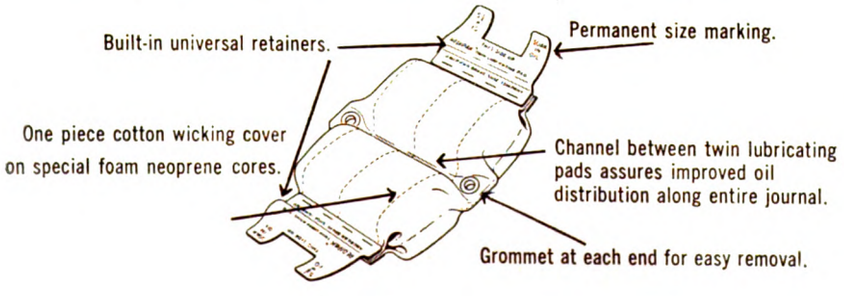
Is it durable?

In many tests, Redipak Twin pads have operated over 100,000 miles without noticeable wear or any sign of glazing. The covers do not lint.

Is it resilient?

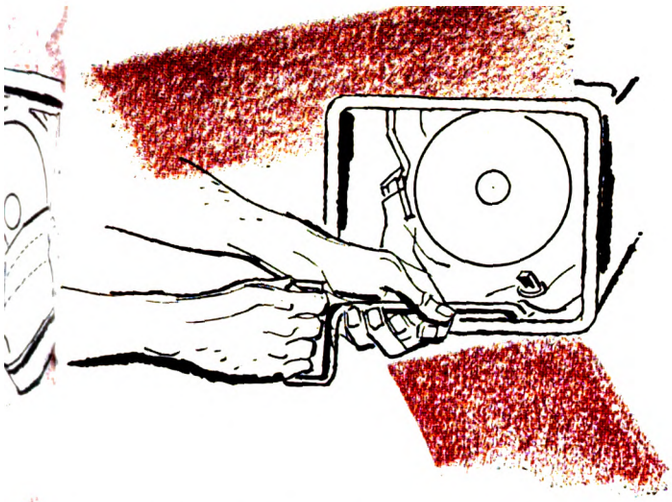
A successful lubricator must contact the journal at all times. Specially molded foam neoprene cores, compounded to our own specifications, assure superior resilience in every Redipak Twin pad.

Only Redipak® Twin Lubricating Pads Meet All These Vital Requirements!



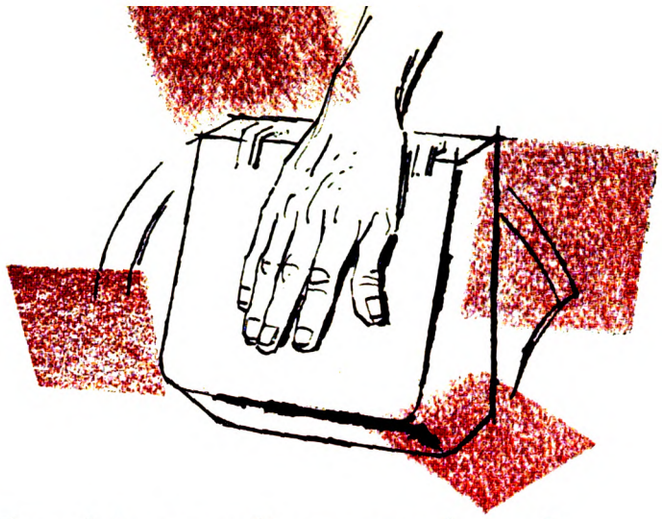
And in addition, Redipak Twin pads feature built-in universal retainers, which prevent shifting due to vibration and shock.

The more lubricating devices you test, the more you will agree with more and more roads: that the Redipak Twin pad is a practical, economical answer to the hot-box problem.



s it easy to remove?

n you remove the lubricating device readily, without bend- it out of shape, breaking pieces off, or tearing it apart? ith the Redipak Twin pad, you just hook the sturdy grom- t on the side nearest you, rock it once or twice, and pull it t.



Is it cool running?

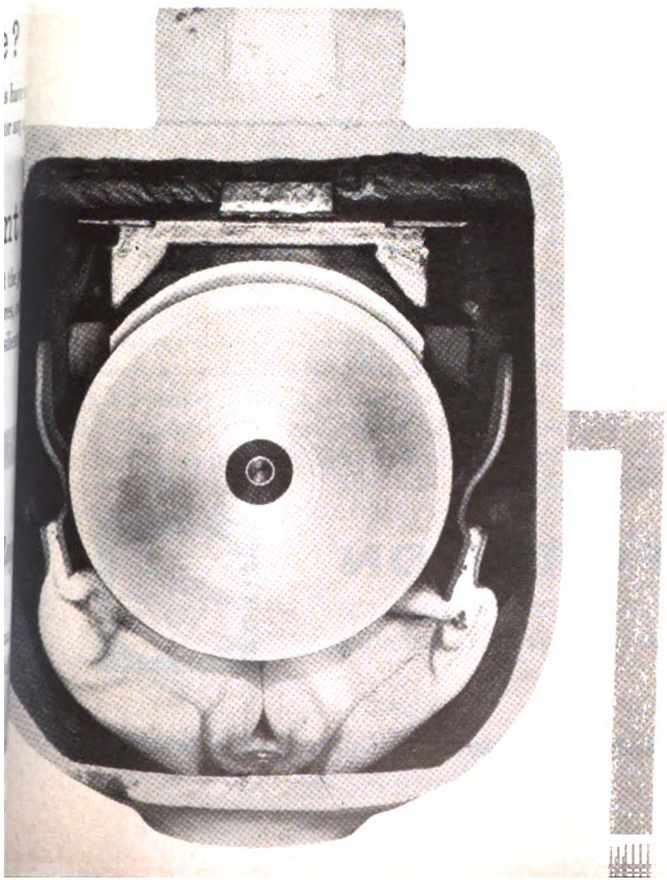
Bearings with Redipak Twin lubricating pads have operated as much as 50°F. cooler than waste-lubricated bearings under identical conditions. This cool-running characteristic and superior wicking action go a long way toward preventing hot boxes.

u test lubricating pads . . .

win Pads Measure Up!

Here are the important things you should look for in a lubricating pad—the vital characteristics that are so necessary to good journal bearing operation.

Check them and you will see why Redipak Twin lubricating pads are your best buy and your best bet for controlling the hot-box problem.



Does it hold enough oil?

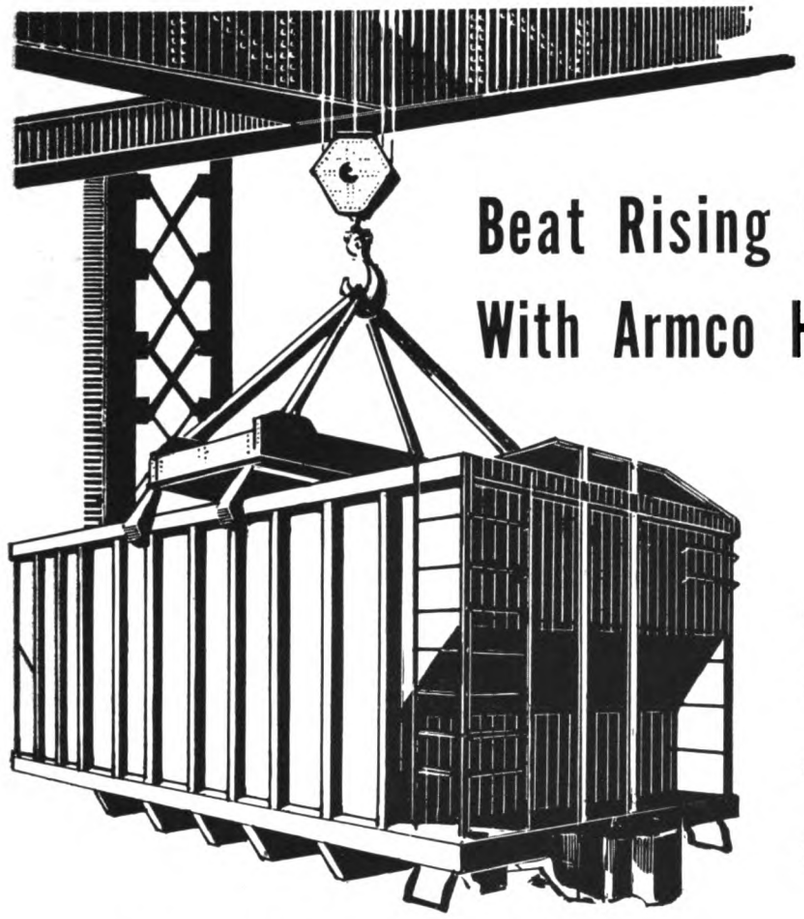
See How Much Oil Redipak Pads Soak Up!

Size	Weight	
	DRY	SATURATED
4¼ x 8	1 lb. 5 oz.	3 lb.
5 x 9	1 lb. 10 oz.	4 lb.
5½ x 10	1 lb. 15 oz.	5 lb.
6 x 11	2 lb. 6 oz.	6 lb.
6½ x 12	2 lb. 12 oz.	7 lb.

Brake Shoe

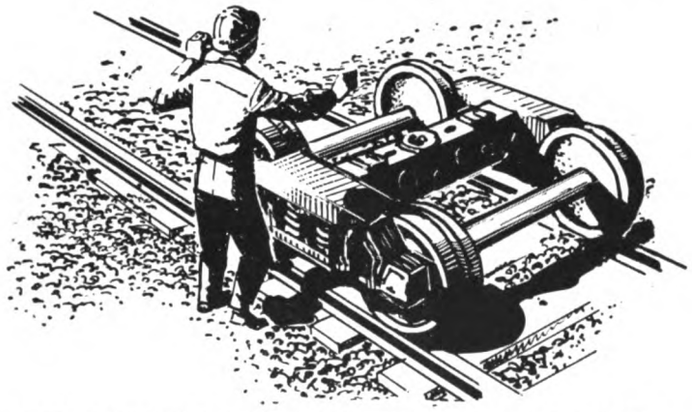
RAILROAD PRODUCTS DIVISION

530 Fifth Avenue • New York 36, N. Y.



Beat Rising Maintenance Costs With Armco High Strength Steel

. . . it extends car life, cuts down on repairs



Armco High Strength Steel keeps car maintenance costs low and cuts time-out-of-service in two ways:

1. Used in the same thicknesses as standard structural steel, it supplies greater strength to resist mechanical damage, shock and vibration—helps cars serve much longer before shop work is required.
2. This durable steel offers 4 to 6 times the atmospheric corrosion resistance of mild steel. The metal actually lasts longer in service.

Alternate Benefit

If you prefer to gain lighter car-weight and greater load-carrying capacity, Armco High Strength Steel offers a second revenue-boosting possibility. You can reduce thickness of car parts without sacrificing service life because of this metal's greater strength and corrosion resistance. Result: More cars per train.

Whether you are interested in reduced maintenance and longer car life, or bigger payloads, it will pay you to investigate low-alloy Armco High Strength Steel. Just fill in and mail the coupon for more information.

Armco Steel Corporation
1947 Curtis Street, Middletown, Ohio

Send me more information about Armco High Strength Steel.

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

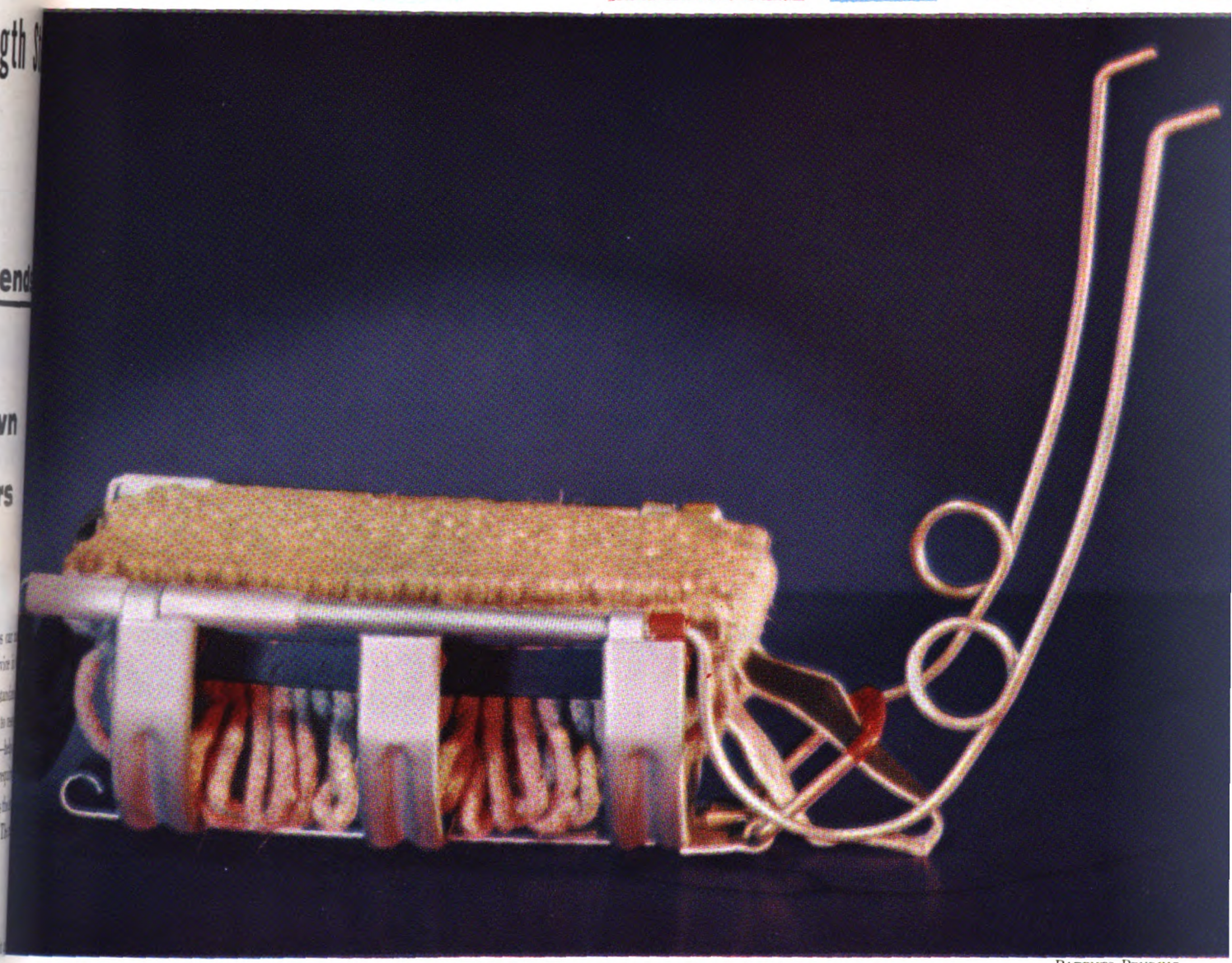
ARMCO STEEL CORPORATION

1947 Curtis Street, Middletown, Ohio

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

ROLIN



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

THE rolin CORPORATION

80 EAST JACKSON BOULEVARD • CHICAGO 4, ILLINOIS • WEbster 9-3587

the new, improved **Adlake** electric lantern

...we invite you to compare it

Railroading itself dictated the improvements which are combined only in this new, lighter weight Adlake Electric Lantern. Think of these benefits in terms of the men who use lanterns:

- **Extruded aluminum bail, heat treated, with heavy coat of neoprene—a firm grip, resists oil, has ample arm clearance.**
- **Bail stays in position, but moves readily on new rivet attachment—tested for 15,000 operations without losing original tension.**
- **Stainless steel reflector—stays bright.**
- **At a flip of the switch, the lantern throws either a strong signal or a brilliant spot for reading car numbers.**
- **Holder in the cap for two spare bulbs.**

We invite you to make your own comparison, and when you have tried this lantern we believe you'll agree that it is the finest available. There's no obligation... write The Adams & Westlake Company, 1152 Michigan, Elkhart, Indiana.

The Adams & Westlake Company

Established 1857 • Elkhart, Indiana • New York • Chicago

Adlake — 100th ANNIVERSARY 1857-1957

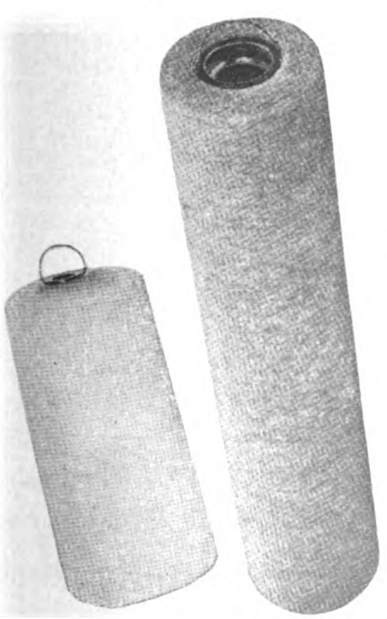
BIG, BURLY, BEAUTIFUL ...and oh, so *Vulnerable!*

Any care less than the very best, for Railroad Diesels, just doesn't make sense! Despite its size and cost your Diesel engine is exactly as susceptible to the ravages of dust, dirt, grit and other contaminants as the cheapest car engine.

Compare the care the motorist gives his $2000 car with that given a $2,000,000 Diesel locomotive! Today's car engine has the protection of a lubricating oil filter, a gasoline filter and an air filter... all with a high degree of engineering back of them.

On the other hand, there are still some railroads that are packing cans with waste to filter Diesel lubricating oil. Of course, the majority have a more enlightened appreciation of the menace of dust and dirt. Many employ WIX Engineered Filtration as standard practice.

WIX has invested thousands of man hours in research... the engineering has been done... the facts are here for your engineers to read. WIX is ready with proven filtering media for both fuel and lube oils, plus years of Railroad filtration "know-how". Write for full information today.



LUBE wix® **FUEL**

RAILROAD OIL FILTERS

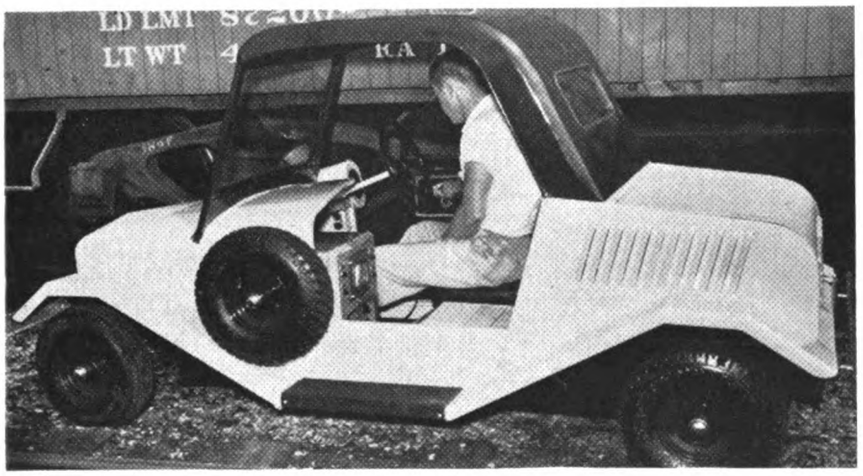
WIX CORPORATION · GASTONIA, N. C.

Warehouses:

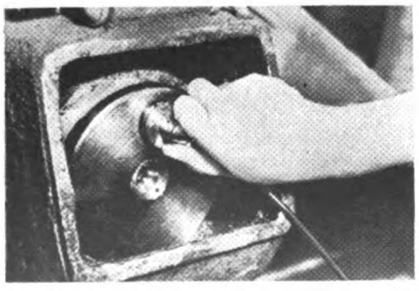
GASTONIA · NEW YORK · ST. LOUIS · DES MOINES · SACRAMENTO

HELPING TO KEEP YOUR ROLLING STOCK SAFE

TEST 320 FREIGHT CAR AXLES A DAY AT 8.2 CENTS AVERAGE COST PER JOURNAL

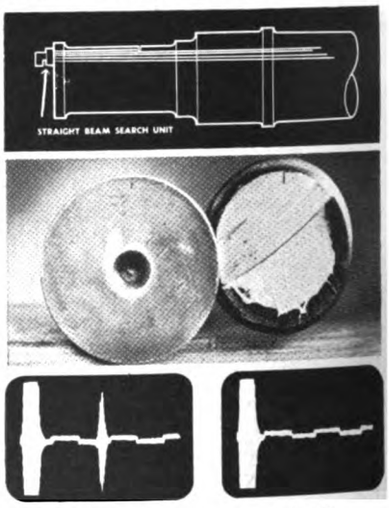


Sperry Journal Test Cars in use on one of the country's leading railroads have achieved these results over more than a year's operations. Other accomplishments are equally impressive. Through January 1957, a total of 153,198 freight cars were checked. On these cars 328 cracked and defective axles were discovered. Findings to date average one faulty axle for every 467 cars inspected.



The Sperry Journal Test Car provides for fast, simple and positive journal testing. The operator drives the Test Car easily and rapidly alongside freight cars on the track; testing is done without leaving the car and one operator can check up to 80 cars daily.

HOW TO "DRIVE-TEST" WITH REFLECTOSCOPE®



The search unit, *placed on the end of a freight car journal, beams ultrasonic sound waves through the axle. Any defect, crack or flaw in the journal interrupts the sound beams and sends its reflection back to the Reflectoscope, where it is pictured on a cathode ray tube. The sketch shows an axle defect and its picture on the tube, which is mounted directly in front of the driver's seat.*

Mechanical Departments *gain benefits in time, labor and money from this speedy, sure method of journal testing. Your Sperry Sales Engineer will be glad to give you the complete details. If you wish, we will send you literature.*

Sperry

SPERRY RAIL SERVICE

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Supplying Railroads Exclusively

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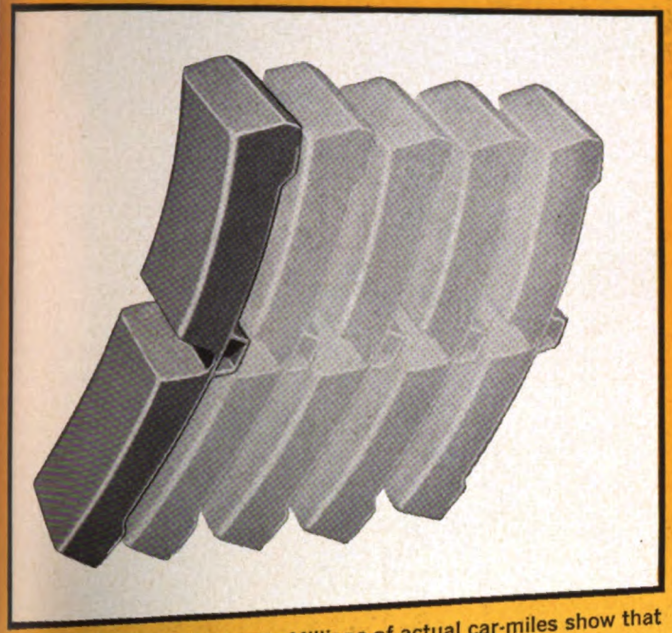
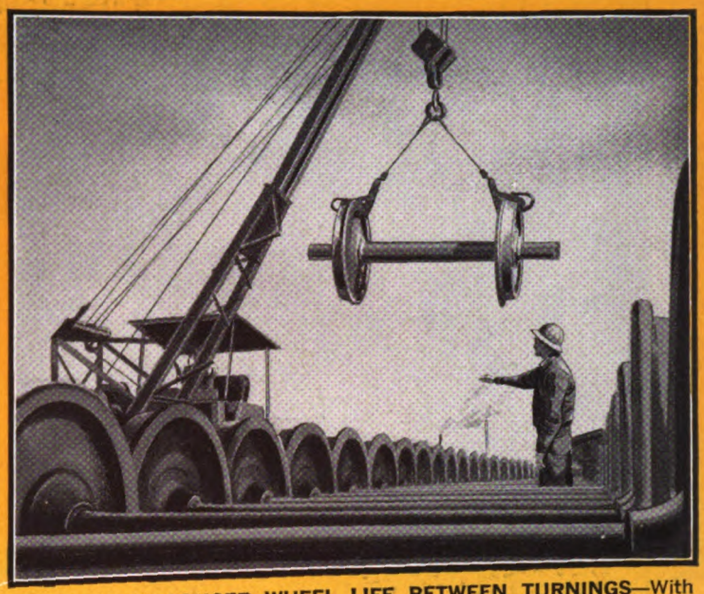
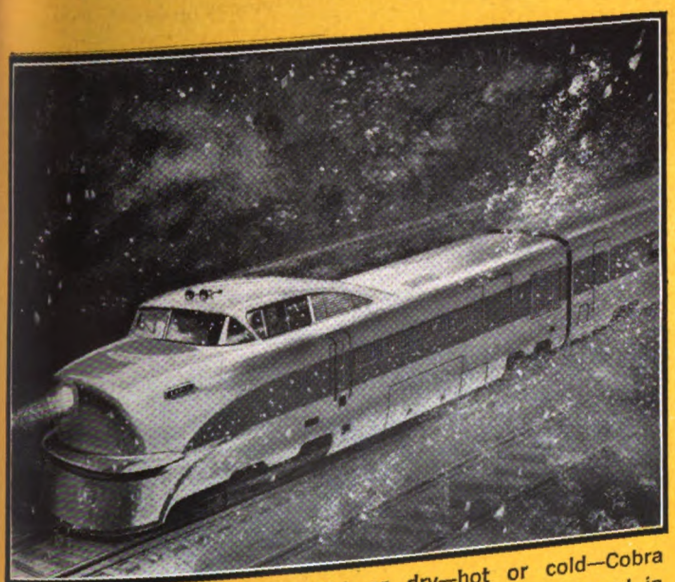
COBRA* SHOES offer 4 Major Advantages



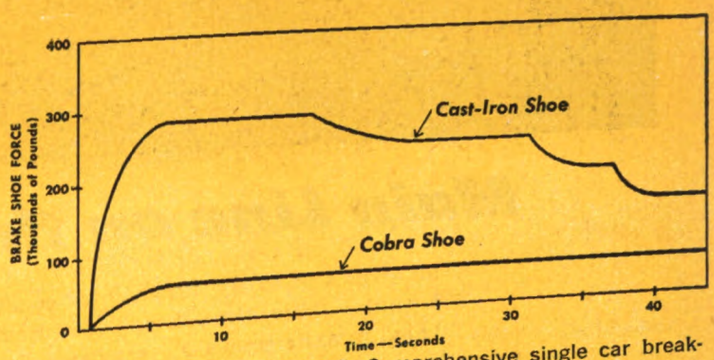
4 TO 5 TIMES THE SHOE LIFE—Millions of actual car-miles show that Cobra Shoes last four to five times as long as cast-iron shoes under matched conditions.



50 TO 100% LONGER WHEEL LIFE BETWEEN TURNINGS—With braking performance matched, wheel life between turnings has consistently averaged 50 to 100% more in favor of the Cobra Shoe.



ALL-WEATHER PERFORMANCE—Wet or dry—hot or cold—Cobra Shoes meet existing standards for stopping distances. Proved in actual railroad service.



60-80% LESS BRAKING FORCE—Comprehensive single car breakaway test shows the higher Cobra Shoe friction requires 60-80% less braking force than cast-iron shoes for equivalent retardation. Lower braking forces permit simplification and weight reduction of brake rigging and related components.

Result: *Savings up to $1400 per passenger car per year.*

** Registered U. S. Trademark—Composition Brake Shoe*

The COBRA* SHOE — product of the combined research facilities of

Westinghouse Air Brake Company
Specialists in Braking

Johns-Manville
Specialists in Friction Materials

RAILROAD FRICTION PRODUCTS CORPORATION, Wilmerding, Pennsylvania

REPORT FROM A LEADING MID-EASTERN RAILROAD

Air-Maze oil bath air filter

cuts engine wear 45% in 31-month test!

A LEADING railroad's 31-month test of an Air-Maze oil bath filter shows how maintenance costs can be cut and life of power assemblies increased. This test, made on an Alco 1600 hp road switcher, illustrates why so many top-flight railroads have switched to Air-Maze oil bath filters for air intakes on diesels in freight, passenger and switching service.

Here are the facts on filter maintenance:

"Regular checks of oil level and dirt in filter bowls indicated that a 3-month period between oil changes was entirely adequate for diesel engine protection. Filter operated 5 months before initial oil change was required."

"Once-a-year cleaning of Air-Maze oil bath filters provided clean air with no evidence of dirt being carried into intake manifold."

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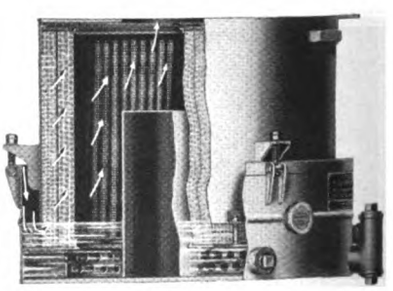

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Additional data furnished on request.

The biggest names in diesels are protected by Air-Maze filters.

AIR-MAZE
The Filter Engineers

GEARED TO PROGRESS
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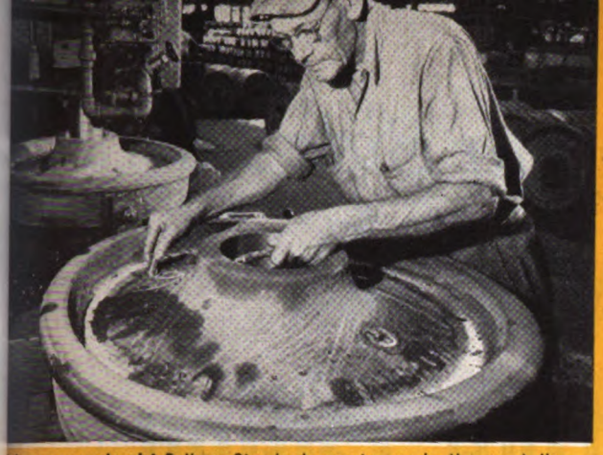
ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • PASSENGER CAR FILTERS



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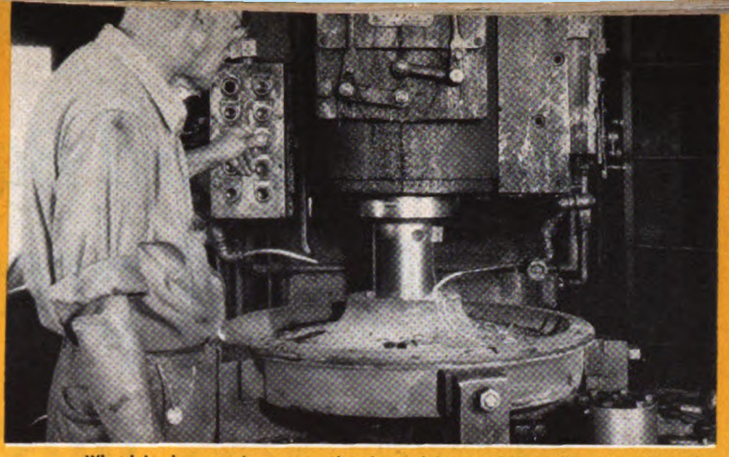

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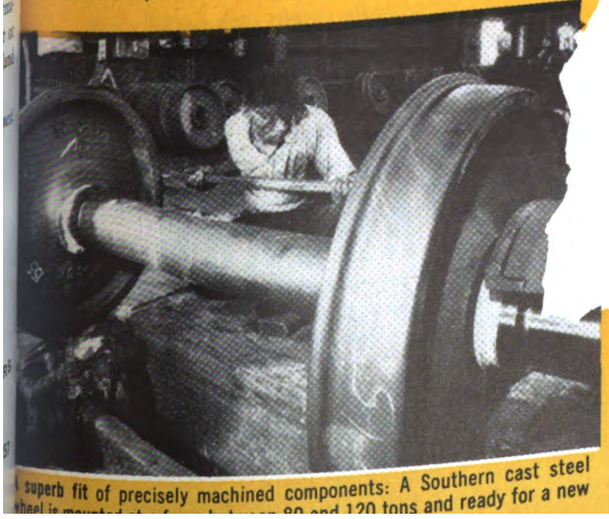

A superb fit of precisely machined components: A Southern cast steel wheel is mounted on [illegible] between 80 and 120 tons and ready for a new

Putting Southern® Wheel Quality to Work . . .

in mass-production wheel mounting at Pullman-Standard

At Pullman-Standard Car Manufacturing Company's Bessemer, Ala., plant, Southern cast steel wheels have fitted perfectly into a highly mechanized wheel mounting technique that demands the utmost in wheel quality.

Wheel mounting, with minus tolerances of 0.006 to 0.007" and joining forces limited to 80 to 120 tons, is an exacting art made more exacting by mass production conditions.

One of the important foundations that Pullman-Standard relies upon to maintain precision and production is the uniform quality of Southern cast steel wheels—their accurately controlled hardness, their true concentricity and balance—factors that insure dependability and lasting performance.

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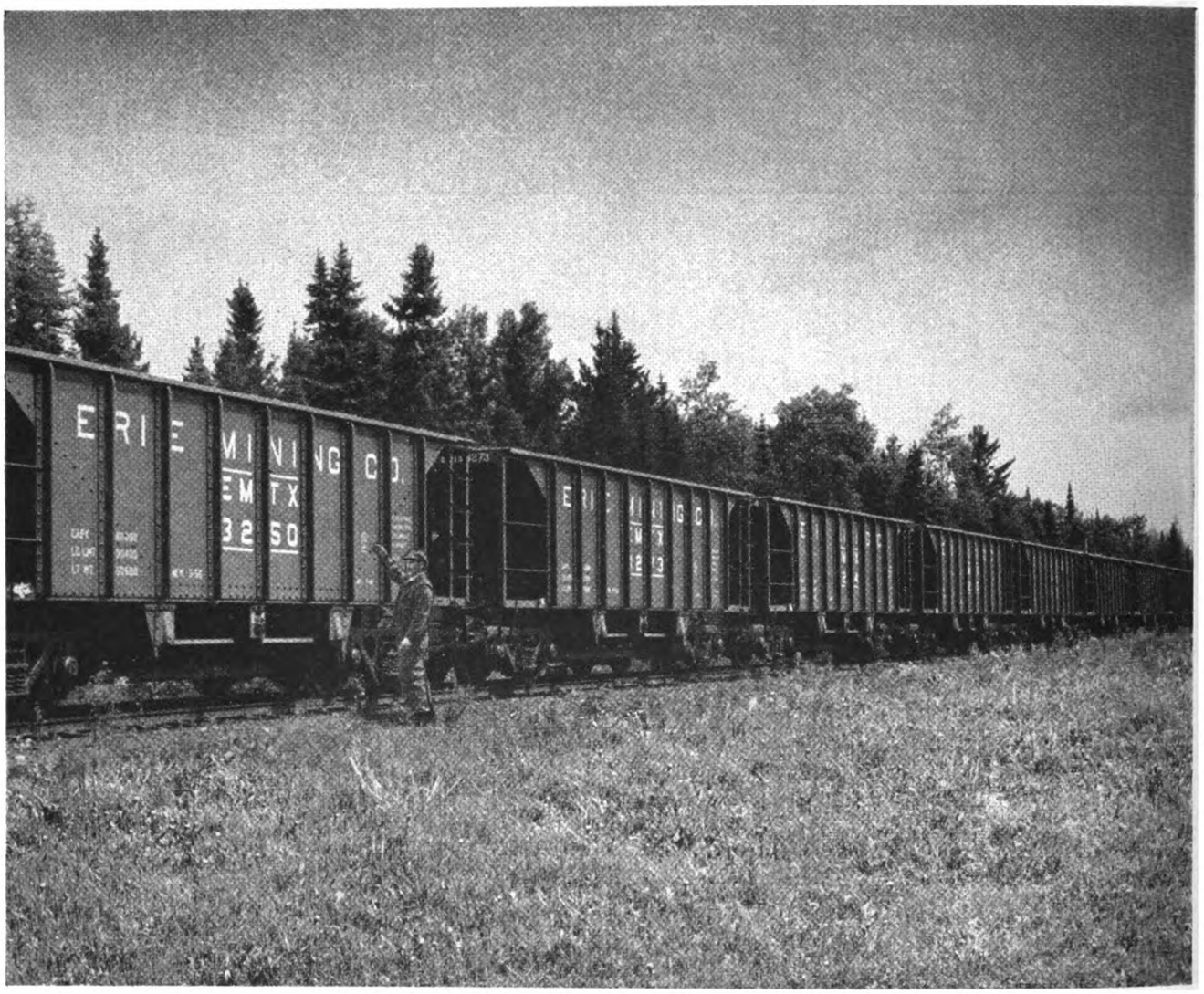
530 Fifth Avenue, New York 36, N. Y.



Main Line on the Taconite Run

This stretch of lonely, uninhabited country lies between Hoyt Lakes and Taconite Harbor, Minnesota. The railroad, operated by Erie Mining Co., is used to haul taconite from the great processing plant at Hoyt Lakes to the harbor on Lake Superior, 73 miles away.

The 389 hopper cars required for the system were built by Bethlehem at its Johnstown, Pa., shops. Each of the cars has a capacity of 95 tons, and when level-full holds 1433 cu ft of load. The four-hopper bodies are of riveted-and-welded construction, and the cars are equipped with Type F couplers, 36-in. multiple-wear heat-treated wrought-steel wheels, forged-steel heat-treated axles, empty and load and clasp brakes. Items such as these are an aid to safe, dependable service, and they help reduce maintenance and repair expense.

The cars are excellent examples of what Bethlehem can build in open-top designs. When your own requirements call for something of this nature, by all means check with our engineering division. We can design the type of car you have in mind, or work from plans that you yourself supply.

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(Patents applied for)

70-ton covered hopper car with Enterprise Pneumatic Outlets in combination with Enterprise Cast Steel Frames and Gates

Close-up view of Enterprise Pneumatic Outlet for covered hopper cars

To the long list of successful firsts since 1905—ballast cars, gondola cars, hopper cars, ore cars, covered hopper cars—ENTERPRISE now adds the Pneumatic Outlet for covered hopper cars.

This *newly* developed valve in combination with ENTERPRISE Cast Steel Frame and Gate makes covered hopper cars more versatile in a choice of two unloading systems—the conventional gravity flow bottom discharge, and by *pneumatic conveyor*. The car is unloaded, by *one man* using either system.

Responding to a challenge, the *Pneumatic Valve* was developed for sanitation, and for easy unloading of dry, granular, or powdered commodities. It can be applied to any existing covered hopper car equipped with ENTERPRISE Discharge Gates as well as new ENTERPRISE equipped covered hopper cars.

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REPORT FROM A LEADING MID-EASTERN RAILROAD

Air-Maze oil bath air filter

cuts engine wear 45% in 31-month test!

A LEADING railroad's 31-month test of an Air-Maze oil bath filter shows how maintenance costs can be cut and life of power assemblies increased. This test, made on an Alco 1600 hp road switcher, illustrates why so many top-flight railroads have switched to Air-Maze oil bath filters for air intakes on diesels in freight, passenger and switching service.

Here are the facts on filter maintenance:

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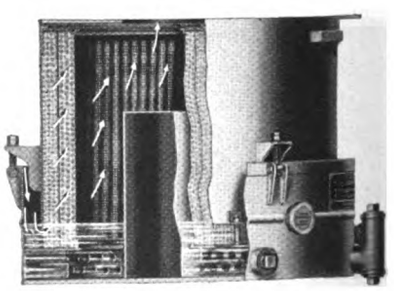

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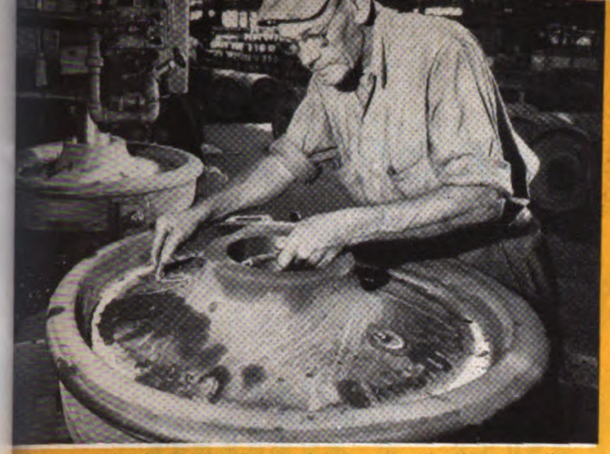

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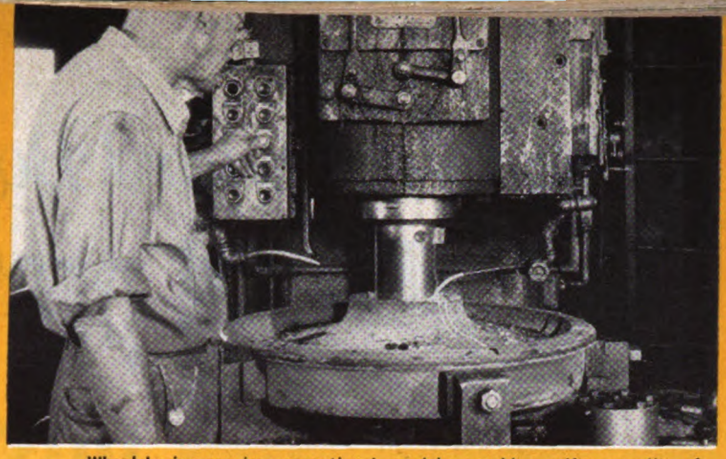

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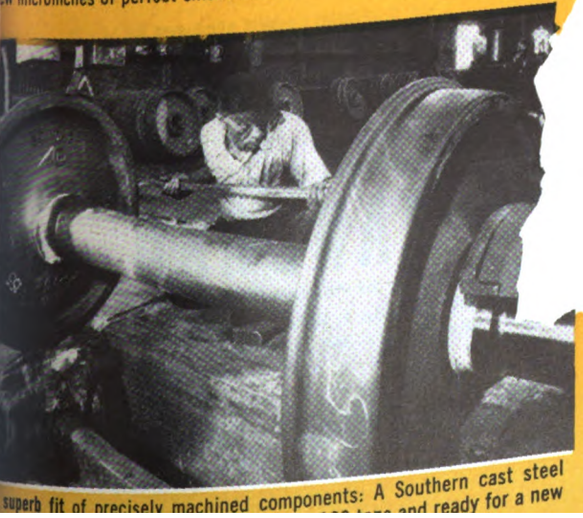

A superb fit of precisely machined components: A Southern cast steel [illegible] and ready for a new

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COMPANY

RAILROAD PRODUCTS DIVISION
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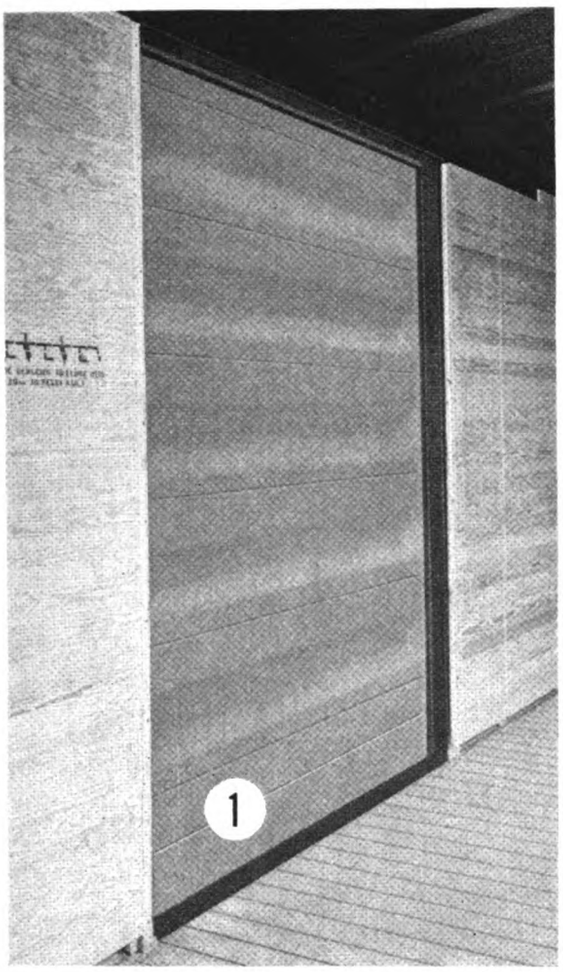
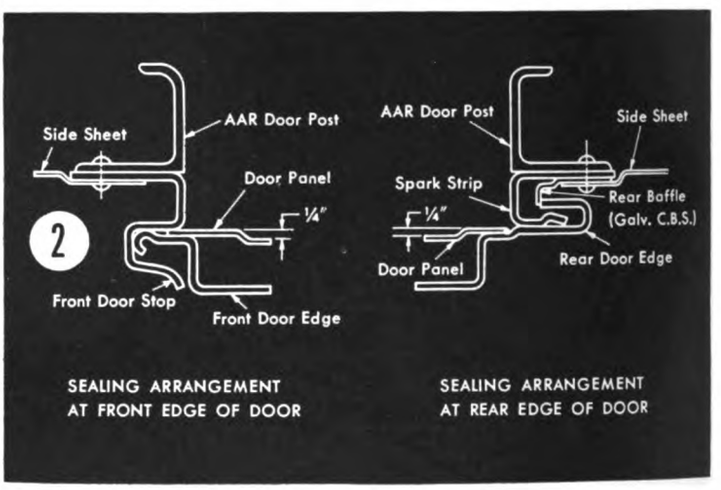
Pullman-Standard Box Car Side Doors



provide positive lading protection



1 **SMOOTH INTERIOR PREVENTS DOOR DAMAGE TO LADING!** Pullman-Standard design allows the door interior to be finished with a smooth, even surface. All framing members are on the exterior. Door fixtures are arc-welded to the outside surface. No bulges, ridges or sharp edges to cause lading damage.

2 **SURFACE SEAL EDGES KEEP WEATHER AND DIRT OUT!** The Pullman-Standard box car side door design insures a positive seal through a special baffle arrangement that brings about surface contact on all four edges of the door. Water, light and flour tests plus years of rugged on-the-road service have proved that this sealing mechanism positively shields lading from weather and dirt. Watershed top retainer and trough type door header provide additional weather protection.

- Sizes: 9' 11" or specified height. 6', 7', 8', 9', 15' or specified width.
- Heavy-duty combination lower panel and framing member of 5/32" corrosion-resistant, copper-bearing steel to withstand loading dock abuse.
- Other panels of .10-inch corrosion-resistant copper-bearing steel. Fixtures of forged or cast steel to withstand service abuse. All parts can be repaired by welding if accident-damaged.
- 5" rollers with durable cage type roller bearings insure trouble-free, easy operation.
- All welded, precision fabricated, embossed for strength.
- Corrosion pockets eliminated by welded assembly.
- Self-protecting design and fabrication excellence provide for long life, easy maintenance.

For complete details and specifications on the P-S Box Car Side Door contact your nearest Pullman-Standard Sales Office or write to the address below.

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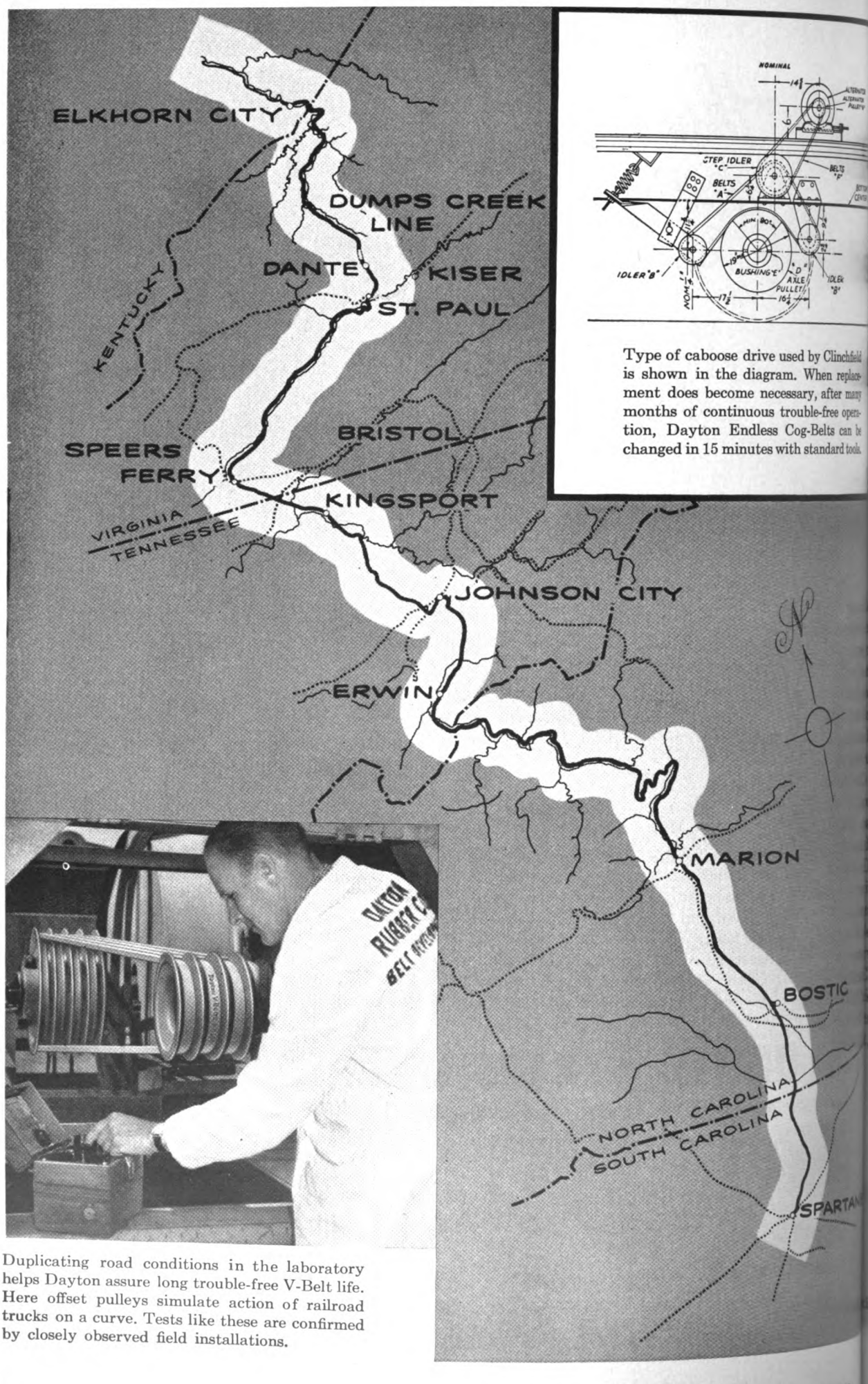

Type of caboose drive used by Clinchfield is shown in the diagram. When replacement does become necessary, after many months of continuous trouble-free operation, Dayton Endless Cog-Belts can be changed in 15 minutes with standard tools.

Duplicating road conditions in the laboratory helps Dayton assure long trouble-free V-Belt life. Here offset pulleys simulate action of railroad trucks on a curve. Tests like these are confirmed by closely observed field installations.

-Belt drives give full

adio Power on America's most

iarply curved Mainline Road

0 miles of curved mainline track; yet Dayton caboose drives deliver long, trouble-free low-cost service.

lio communication—between Engineer, ca-
se and wayside—was part of the moderniza-
program on the Clinchfield Railroad. Some
hod of driving the caboose generators was
led that would deliver full, continuous power
ll times. It had to combine low initial cost
ı minimum maintenance.

n excellent proving ground for equipment,
Clinchfield twists tortuously for 276 miles
ugh the mountains of North Carolina, Ten-
ee, Virginia, and Kentucky. (Connecting
ı the Atlantic Coast Line and the Chesapeake
hio Railway, it helps provide 3rd morning
very of perishables from Florida to Detroit.)
gest single stretch of straight track is two
s. Of the 276 miles, 110 have some degree of
vature—many of them 10 to 14 degrees.

linchfield's engineering staff, headed up by
ef Engineer J. M. Salmon, Jr., Signal Engi-
· W. E. Prince, and assisted by Superintend-
Machinery P. O. Likens, studied both direct drives and several types of V-Belt drives. They knew their railroad and the demands it made on equipment. They chose the Dayton V-Belt Caboose drive for its relatively simple design.

With the help of Dayton Field Engineers the first installation was made in November, 1955. Experience showed a need for only minor adjustments. Every mainline train is now equipped with two-way radio. Forty drives were installed.

Service, according to the men of Clinchfield, is even better than expected. The drives have given the dependable, economical source of power needed. And despite operation on sharply curved tracks, they have provided continuous trouble-free service.

Dayton V-Belts can give you the same month-after-month low maintenance service. Help in the solution of your drive problems will be gladly provided by the Dayton Railway Field Engineer. Write The Dayton Rubber Company, Railway Division, Dayton 1, Ohio.

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Dayton Rubber

World's Largest Manufacturer of V-Belts

The Dayton Rubber Co., Railway Div., Dayton 1, Ohio

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We have NEVER received a

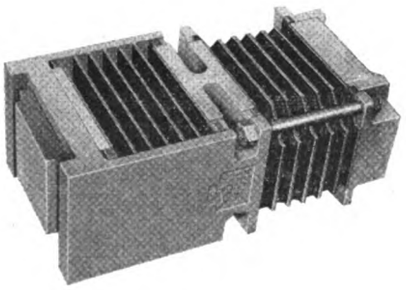
single report of failure

of a properly applied

National Rubber Draft Gear.

This is because the gear

is correctly designed.



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Established 1868

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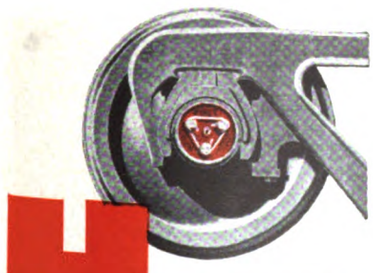
ONE MORE BIG REASON IS HYATT HY-ROLL BEARINGS for non-stop freight. No need to delay *this* car for bearing inspection or lubrication—he can see at a glance they're dependable HYATT Hy-Rolls! That means there's a 3-year lubricant supply sealed in. It means no more hotboxes. It means husky *straight cylindrical rollers* with extra load-carrying capacity for extra reliability. That's why 38 leading lines have already adopted the HYATT Hy-Roll as a basic part of their modernization programs —to help give America even faster freight service.
Hyatt Bearings Division of General Motors Corporation, Harrison, N. J.



Another GM GENERAL MOTORS contribution to railroad prosperity

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

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100% Magnaglo* inspected
...so that the wheels you get are 100% perfect
To avoid completely the element of chance, Griffin inspects *every* EQS Wheel with custom-engineered Magnaglo equipment. If a defect is found in only one wheel out of a thousand, the process serves its purpose. Such carefully inspected wheels are a far cry from what railroads used to get . . . but so is the Griffin EQS!
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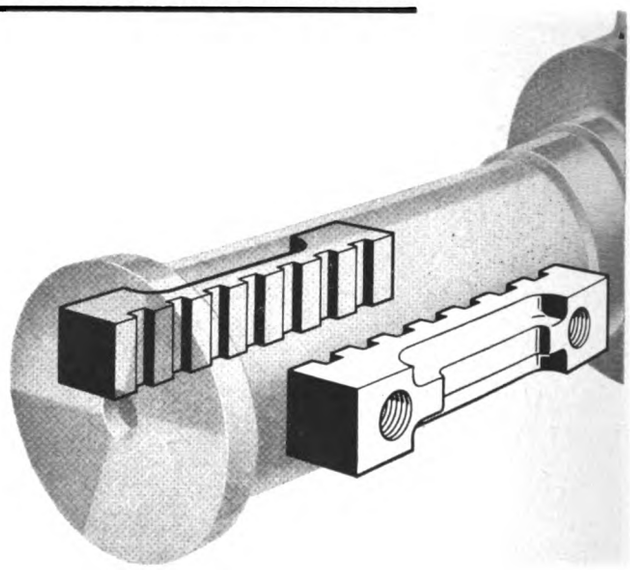
average better than 6,000,000 car miles per setout...

a FAR BETTER RECORD than

with any other journal box device!



Stabilization of bearing assembly provides a low-cost means of getting better bearing performance, FAST

MORE than 3,000 freight cars are now equipped with Magnus Journal Stops. These cars have chalked up more than 32,000 car months of service — with only 6 bearing failures. That's an average of better than SIX MILLION CAR-MILES per setout. And it's a performance record that you can't beat with any other type of freight car bearing, regardless of price!

Journal Stops make this kind of performance possible because they eliminate the major cause of bearing trouble — excessive fore-and-aft movement of the journal within the box. Bolted to the box on either side of the journal, they prevent axle displacement even under the most severe switching and braking impacts. Bearing, wedge and lubricator stay *in place* all the time — assuring an uninterrupted oil film, greatly prolonged bearing life and reduced wheel flange wear.

For complete information on R-S Journal Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

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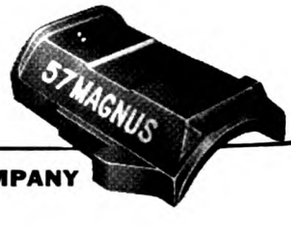


MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Coal Turbine Nears Road Tests

Locomotive Development Committee's coal-fired gas-turbine power plant is nearly ready to move on from the laboratory phase of its development. This was predicted over a year ago in our previous report on the progress of this project (*Railway Locomotives & Cars, May 1956, p 53*). A new coal system and modifications altering the gas flow patterns within the turbine have been under test this year. With these tests completed, LDC will be in a position to project its future course. Already the Union Pacific has signed an agreement with Alco leading to the design of an actual locomotive.

"Right now there is more interest, here and abroad," stated Col. R. B. White recently, "in what this Committee has done and is now doing than at any time in the past." The chairman of the Locomotive Development Committee was commenting on developments and results obtained at the Dunkirk, N. Y., laboratory where the "final commercial acceptability test" of the coal-fired gas-turbine has just been concluded.

A dozen years of basic and applied research dealing with a multitude of problems have produced the power plant which has recently received favorable notice from the AAR Mechanical Division's Committee on Locomotives, from the Union Pacific, from electrical equipment manufacturers, and from the chemical and utility industries.

In 1945 the coal-fired gas turbine project was set up with the aim of continuing coal as a railroad fuel. The incentive then was that coal cost only one-fourth as much per heat unit as fuel oil. Price increases through the years have maintained this relationship right down to the present time.

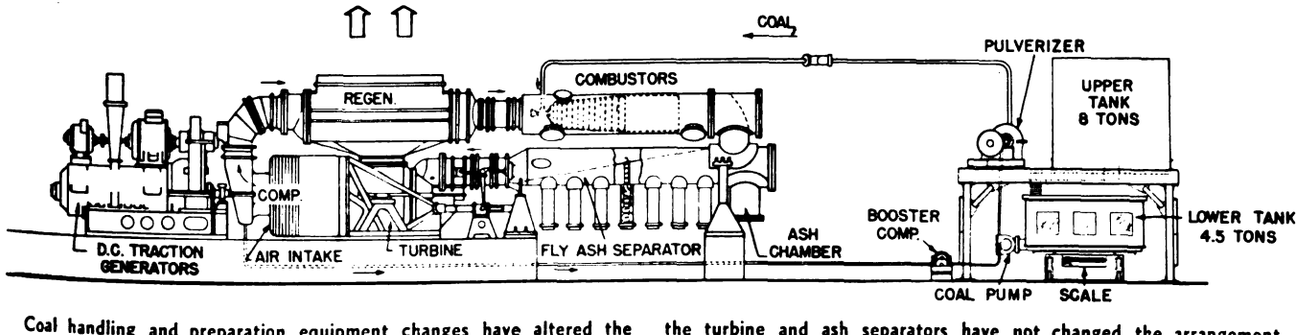
Originally the aim was for the locomotive to be fueled with run-of-mine coal; and it was to be able to burn this fuel. Mechanization of mining since 1945 has rendered the then universal run-of-mine specification almost obsolete today. Mechanized mining equipment indiscriminately digs dirt and rock along with the coal and has made large scale mechanical cleaning necessary.

Removal of this dirt and rock is done in high capacity preparation plants where coal is washed, dried and screened. Coal from large coal companies is all produced to specification with size, ash and moisture content closely controlled.

In 1953, LDC began to work toward the eventual use of an "air fluidized" coal system which would take ¼-in. by 0-in. or 3/16-in. by 0-in. coal from wayside storage and handle it through the combustion process in an air stream (*Railway*

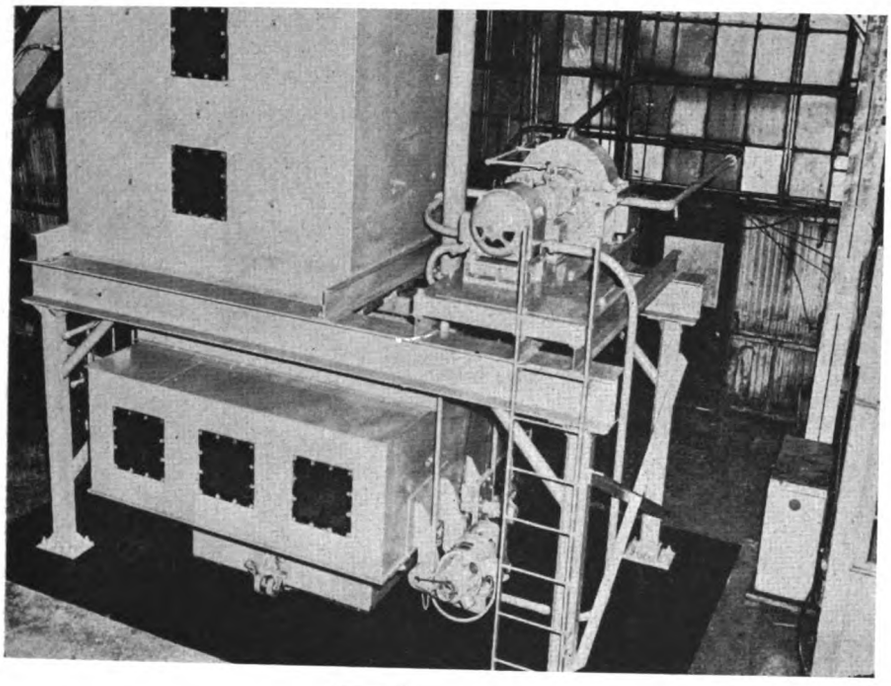
(*Continued on p 39*)

This Is The Way the Dunkirk Gas Turbine Is Arranged.



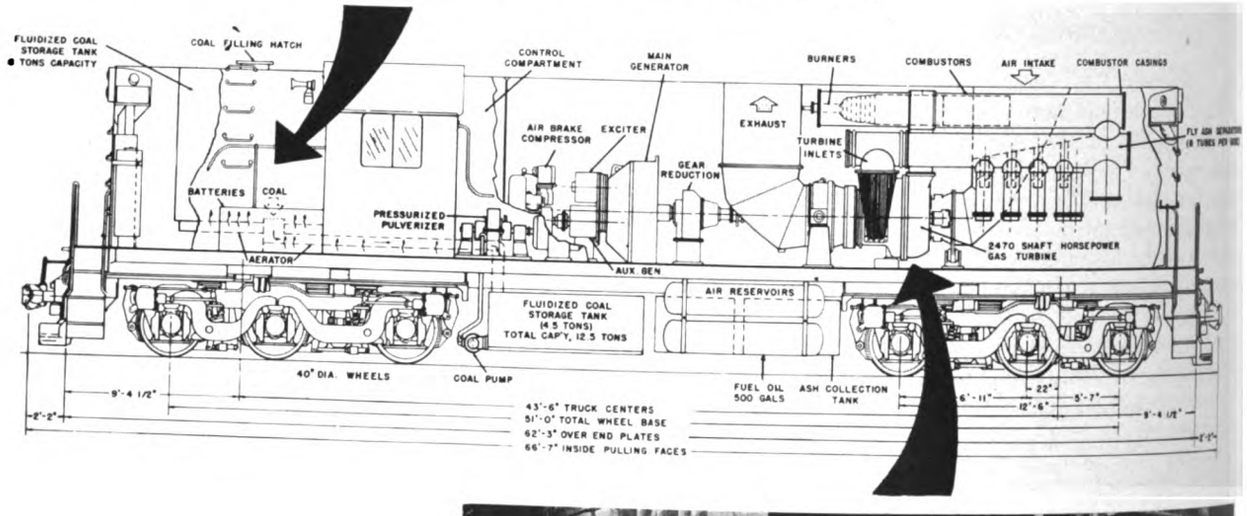
Coal handling and preparation equipment changes have altered the appearance of that part of the test plant at Dunkirk. Alterations in the turbine and ash separators have not changed the arrangement of the equipment at the left of this diagram.

Locomotive Components Are Being Tested



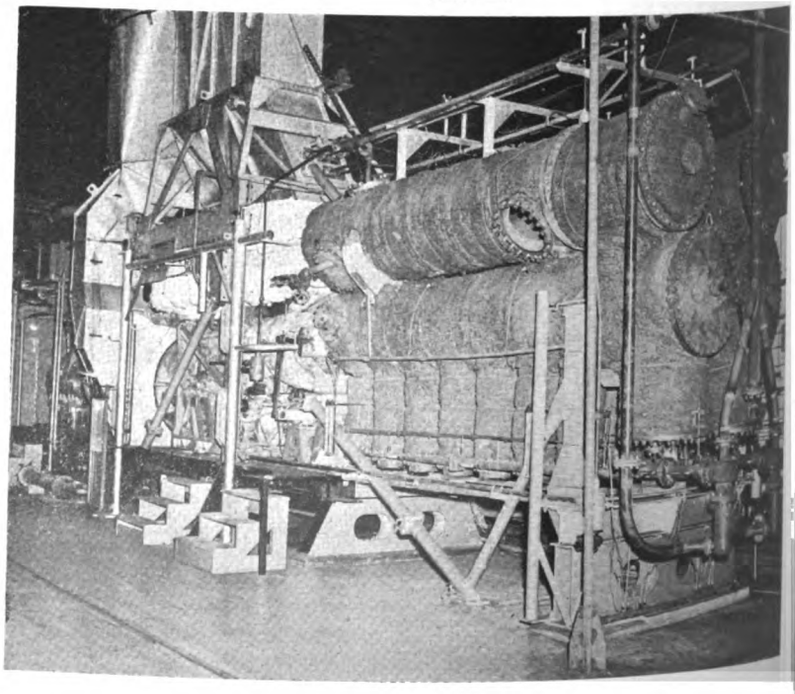
"Aerated" Coal System

Under test at Dunkirk has been a full size fuel system for the conversion of an Alco road-switcher from diesel to coal-fired gas turbine power. This includes the 8-ton fluidized coal-storage tank (top) and the 4.5-ton between-the-trucks tank (bottom). At the front of the lower tank is the LDC coal pump and above it is the LDC-Riley pulverizer.



Turbine Modifications

LDC gas turbine and its auxiliaries have always been arranged to fit within the confines of a locomotive carbody. Present program has been testing modifications of the ash collection system, and changes within the turbine itself. Combustors and ash separators are at the right; to the left is the turbine under the regenerator and exhaust duct.



Locomotives & Cars, May 1956, p 55). What LDC is using for fuel is the same grade of coal purchased by electric utilities, a group now using 35 per cent of the national output. This is the cheapest coal available on a heat-unit basis.

During the 1955 test program—previously reported — the original bin-and-feeder coal handling system, built in 1951, was used. This system handled the small size coals without difficulty but it was unduly complicated, heavy, liable to failure, and expensive. The 1957 program has been testing the new design—an air-fluidized arrangement which duplicates the installation that would have to be made on a diesel road switcher if it were converted to the coal-fired gas turbine prime mover.

In this system, a 3/16-in. by 0-in. dried coal flows from aerated tanks without the need for mechanical conveyors (*like the system used in Airslide hoppers—Editor*). This fine coal is then metered and fed by the LDC rotary coal pump into the conveying air which carries it through the LDC—Riley pulverizer to the combustion chamber.

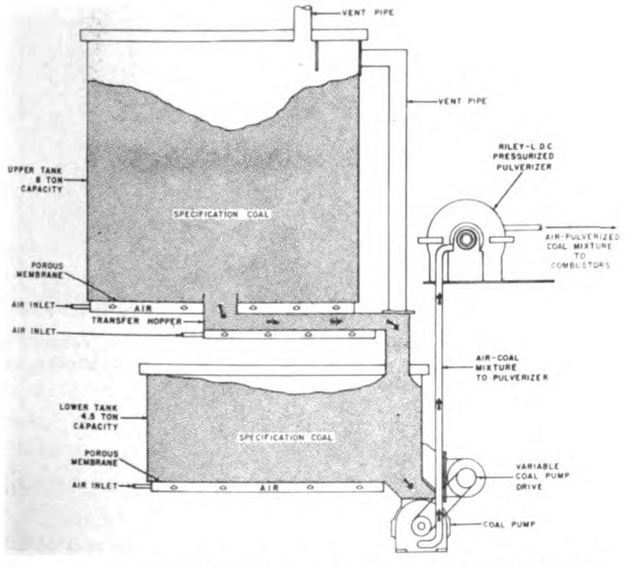
Evaluation of the 1955 test program led the Locomotive Development Committee not only to authorize alteration af the locomotive coal system, but also to authorize a partial reblading of the turbine. In earlier tests, a concentration of dust particles at the roots of the rotor blades had caused localized erosion. Conferences with the National Ad-

(*Continued on next page*)

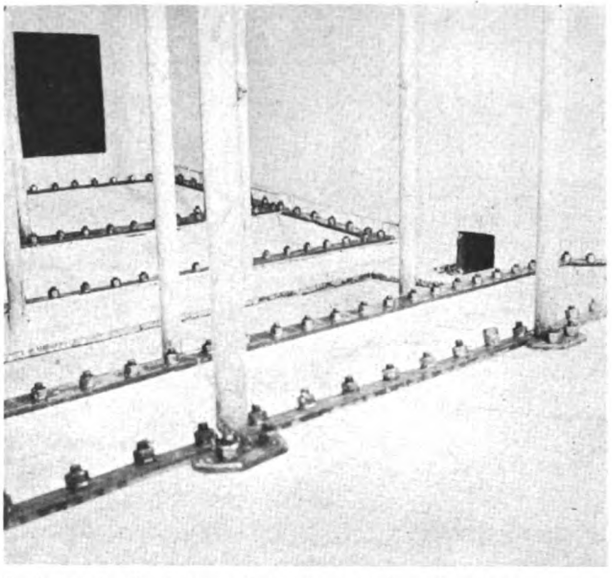
Effectiveness of LDC-Riley Pulverizer

Sieve Size (Mesh)	Pittsburgh Seam "¼ Special"		Pochantas Seam "3/16 x 0 Slack"	
	As Received (Percent)	As Pulverized (Percent)	As Received (Percent)	As Pulverized (Percent)
Above 28	49.2	—	54.1	—
From 28 to 60	27.5	0.2	20.9	0.04
From 60 to 100	9.6	0.8	7.4	0.3
From 100 to 200	8.2	9.4	8.7	3.5
Under 200	5.5	89.6	8.9	96.16

This Is How LDC "Fluidized" Coal System Works

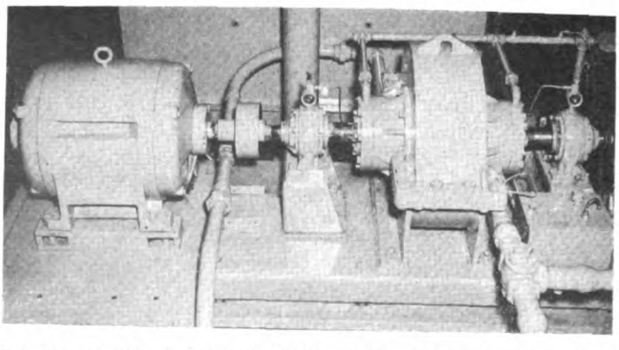


Coal system under test duplicates what would be required for an actual locomotive application. LDC goal would be to make coal handling on and off the locomotive as simple as that for fuel oil.



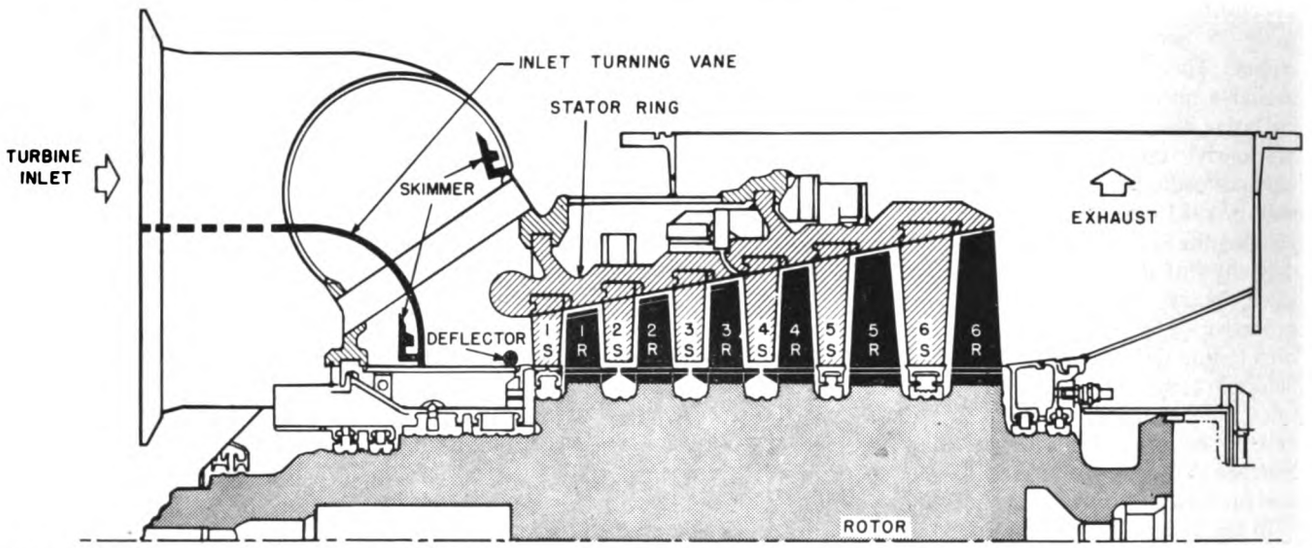
Membrane in the bottom of the lower fuel tank (above) provides passages through which conveying air carries coal to coal pump. Air fluidizing makes it possible to use tanks with shallow slope bottoms.

LDC has done much basic development work in the production, handling, metering, and collection of small solid particles. Chemical industries are interested in the LDC coal pump as a pressurized feeder for their processes, and oil refineries are already using the LDC ash separators (Dunlab tubes) for the collection of catalyst carried over in the refining processes. Even with all of this outside interest, the basic aim of this coal feeding and combustion system is the successful operation of the coal-fired gas-turbine locomotive.



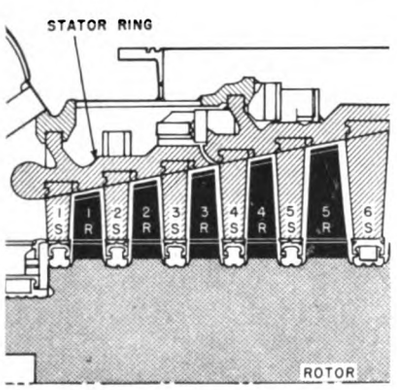
Pulverizer jointly designed by LDC and Riley Stoker has shown itself capable of producing an extremely high proportion of very small coal particles from the utility type fuels being supplied to it.

Turbine Modifications Are Proving Themselves

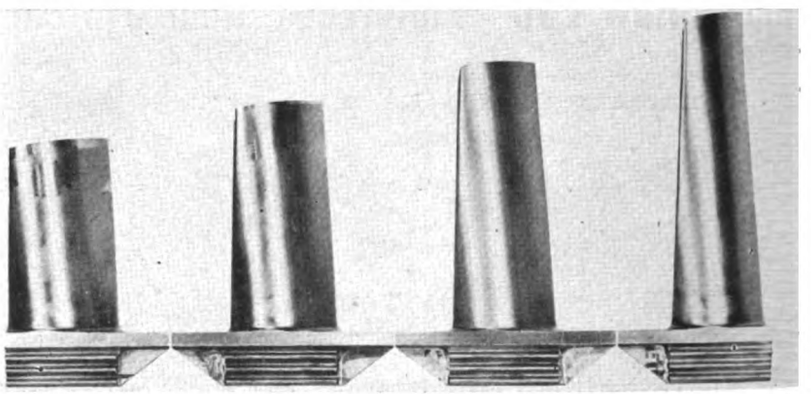


Skimmers and deflector along the turbine inlet (left) are intended to direct ash particles away from critical parts of the rotor blades.

The 1957 arrangement also has eliminated seals under the second, third and fourth stage stator blades (2S, 3S and 4S) for the same reason



Inner stage gland seal rings under the second, third and fourth stage stator blades were the same as those under the first and fifth stages.



Rotor blades now under test have blades with bases designed to fill space formerly occupied by seals. In each stage are two blade alloys. The General Motors alloy is a nickel-chromium-iron material, and the Haynes alloy is principally nickel, chromium and cobalt.

visory Committee for Aeronautics indicated that the Dunkirk problem was one in which NACA had done research. It was a problem of a secondary gas flow pattern being established within the turbine. NACA recommended that the inner stage seal rings be removed and that the space between the rotor blades be closed off. LDC staff members also installed skimmers along the curved surface of turbine inlet to draw off ash particles. Erosion tests by the LDC staff and independent agencies led to the selection of Haynes Stellite HS-31 and General Motors GMR-235 as blade alloys.

Difficulties encountered during the previous test program with ash separators were due to failure of instrumentation which sometimes did not indicate ash build-up. A manifold blow-down has greatly simplified what is now conceded to have been an "over-engineered" arrangement.

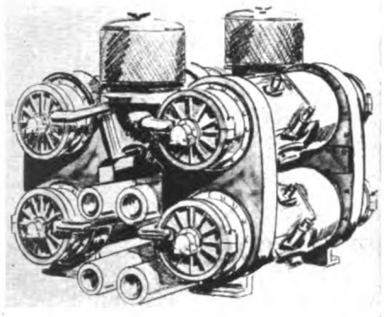
When the planned 1,000-hour commercial acceptability test with Pittsburgh and Pocahantas coals was concluded in mid-August, another series of tests were immediately undertaken before tearing down the turbine for a complete inspection. This new test series consisted of burning several cars of Wyoming lignite supplied by the Wyodak Resources Development Corp. of Gillette, Wyoming.

This fuel has a moisture content of 30 percent. It is a "¼-in. minus coal" and is typical of the fuels found in large quantities along the lines of the Burlington and Great Northern, according to P. R. Broadley, LDC director of research.

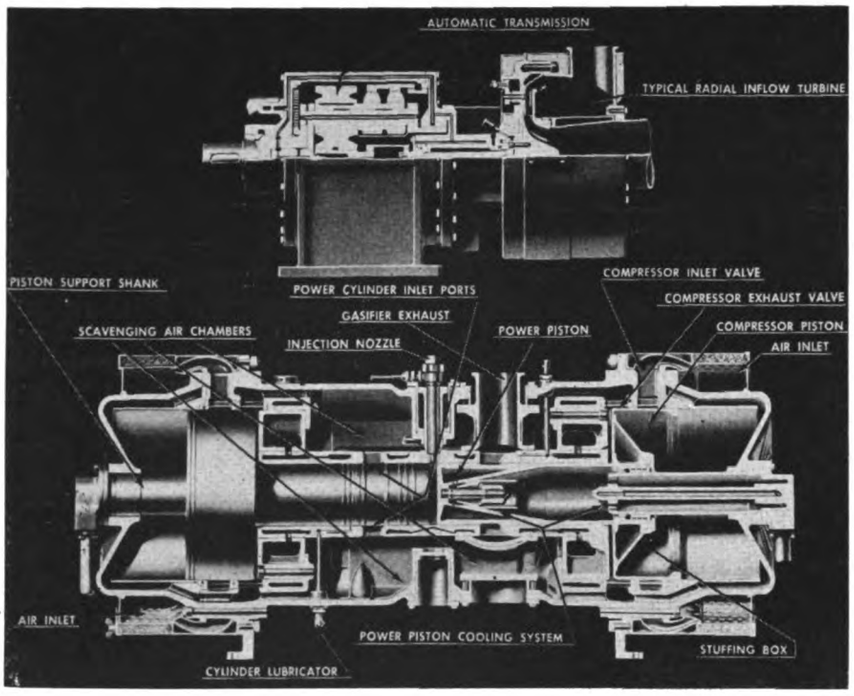
The lignite tests were run to determine the feasibility of generating electric power with this fuel in areas where the large volumes of water necessary for ordinary condensing steam-electric power stations are unavailable. A gas turbine operates without condensers.

The committee is now evaluating the results achieved during the 1,000 hour "commercial-acceptability" test. When the test results are in, information should be available indicating how the coal-fired gas turbine locomotive will be built and what the road test program will be. The current test program has given members of LDC much cause for optimism.

What Part Will These Play in Tomorrow's Motive Power?



Stack of four standard FP-165 gasifiers would be combined to give a 1,000-hp rating. This unit would be 4½-ft x 3½-ft x 5-ft.



Two-stage FP-165 gasifier cross section has above it a typical gas turbine and transmission for conversion from pneumatic to mechanical power. Pistons are free to bounce in their cylinders; have no linkage to any crankshaft.

B-L-H Building Two-Stage, Free-Piston Gasifiers

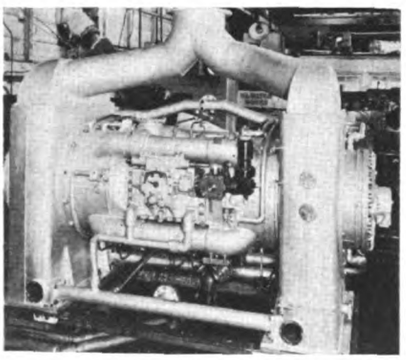
An advanced design of free piston engine has been announced by the Hamilton Division of Baldwin-Lima-Hamilton. Free piston engines produce pneumatic power, in contrast with the crankshaft engine which produces mechanical shaft power. The pistons are free to bounce in their cylinders. They are restricted by the cylinders, but not by any linkage through connecting rods to a crankshaft. Free piston engines deliver their pneumatic output to gas turbines for conversion to mechanical power. One of the most promising immediate uses for this engine is locomotive applications, according to B-L-H.

Power output of the prototype design ranges from 125 shaft hp—available from a single gasifier—up to 1,000 hp when gasifiers are used in multiples feeding to a common turbine inlet. The range is available through the use of two types of B-L-H free piston engines.

Both engines are products of a continuing program of research and development that led first to an efficient single-stage design—the Hamilton Model DL—then to the two-stage, turbocharged design—the Hamilton FP-165.

The DL uses a single stage of compression and a patented movable compressor head to produce an output of 500 hp. DL units can be combined in multiples with one turbine to reach a peak of several thousand shaft horsepower, when turbocharged. The new design FP-165 is a two-stage-compression unit which produces 250 hp with turbocharging; 125 shaft horsepower out. The free piston gas turbine plant can be made directly reversible and will provide reverse power up to 65 per cent of its forward power rating.

The model DL unit has been built and tested over the past two years. It can be produced in quantity for a wide range of applications. The FP-165 has been fully designed. Hamilton Division states that only production development and engineering are required to ready it for actual manufacture. Advanced performance of the Hamilton FP-165 hinges on its second stage of compression. All other free piston engines, and Hamilton's own previous



Tested at Hamilton, O., since 1955 have been two of these DL single-stage gasifiers. This predecessor to the two stage design is 9½-ft long, 5-ft high and 5-ft wide.

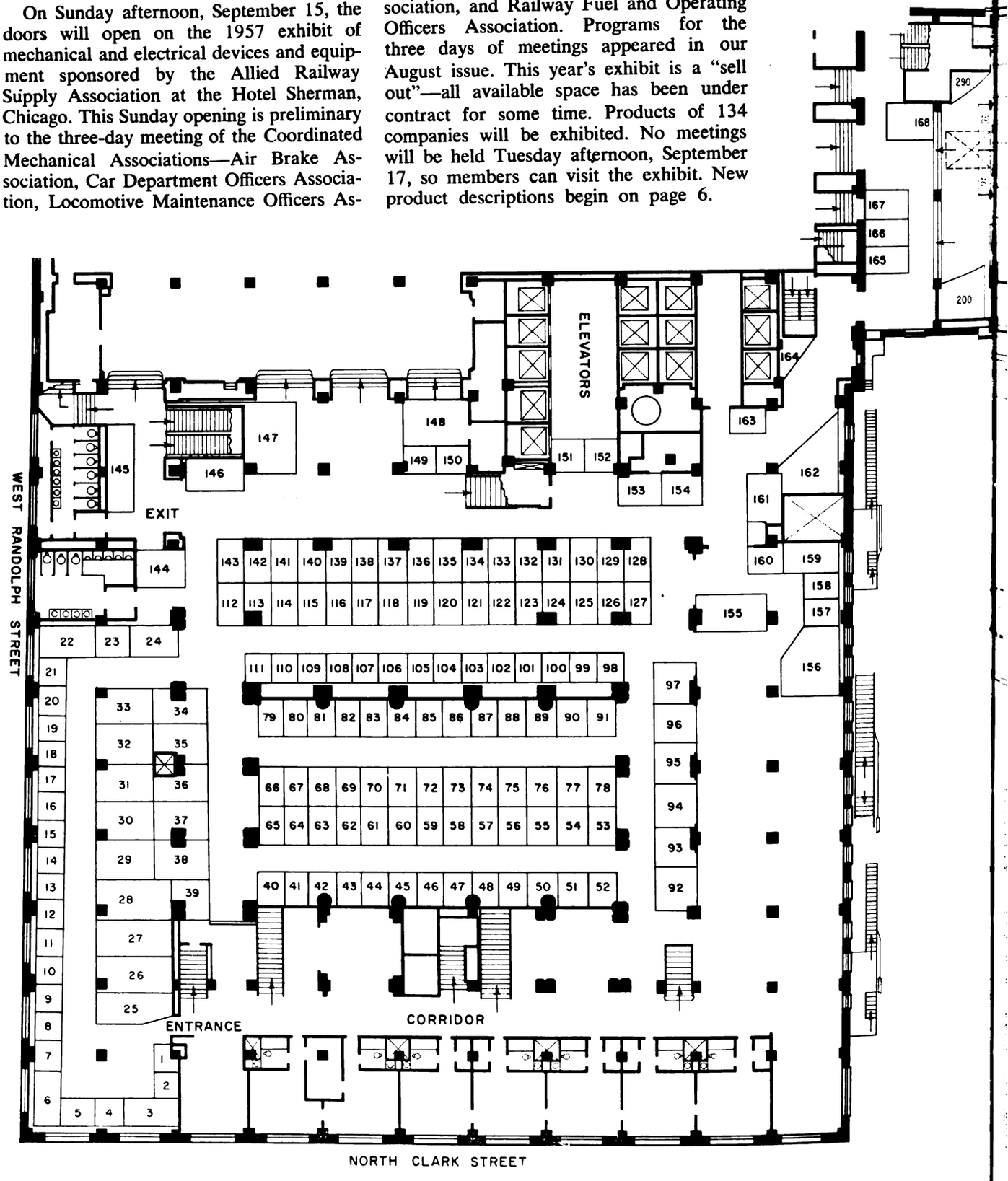
designs, have been single-stage-compression designs. The second stage, by using the energy from the outward piston stroke, affords a balance of energies, and permits a rise in output power without excessive stress and heat on the compressor discharge valves. Because of the inherent balance, the units are virtually vibrationless in operation.

The majority of applications to which the free piston engine could be applied immediately are now

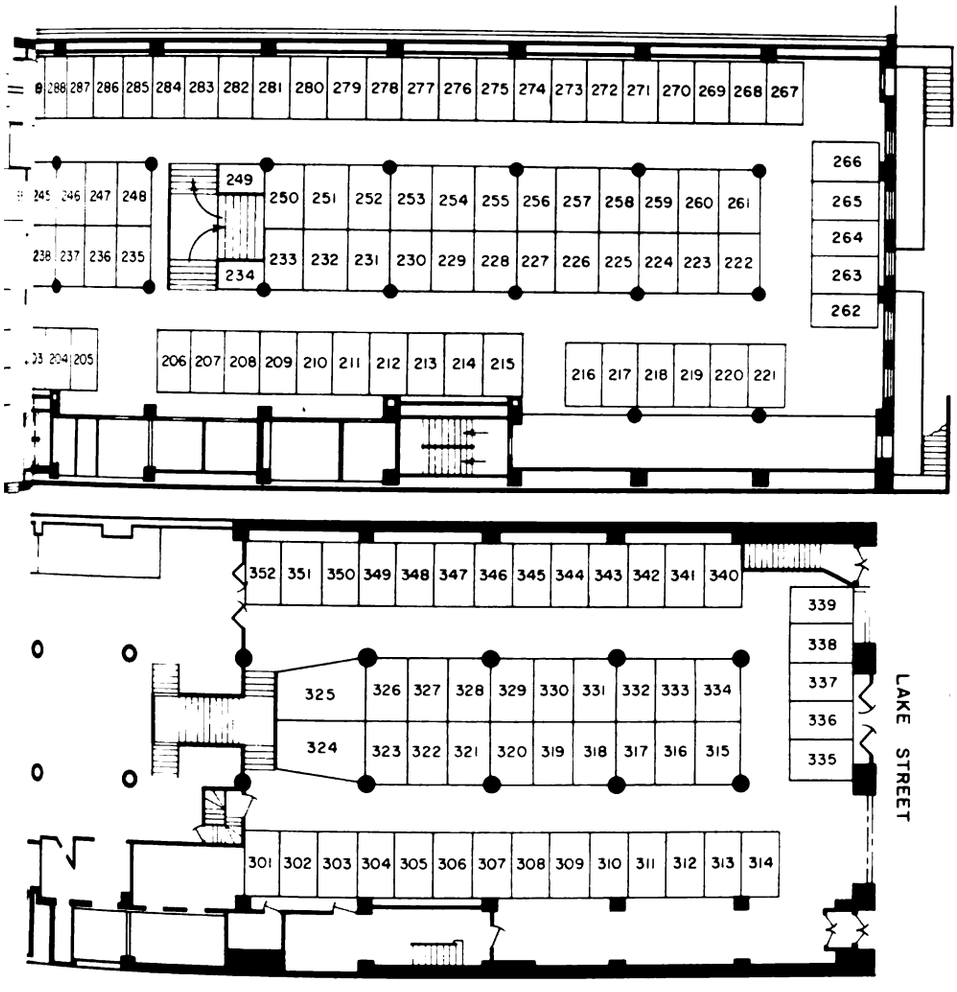
(*Continued on page 52*)

1957's Big Show . . . . . .

On Sunday afternoon, September 15, the doors will open on the 1957 exhibit of mechanical and electrical devices and equipment sponsored by the Allied Railway Supply Association at the Hotel Sherman, Chicago. This Sunday opening is preliminary to the three-day meeting of the Coordinated Mechanical Associations—Air Brake Association, Car Department Officers Association, Locomotive Maintenance Officers Association, and Railway Fuel and Operating Officers Association. Programs for the three days of meetings appeared in our August issue. This year's exhibit is a "sell out"—all available space has been under contract for some time. Products of 134 companies will be exhibited. No meetings will be held Tuesday afternoon, September 17, so members can visit the exhibit. New product descriptions begin on page 6.



Allied Railway Supply Association Exhibit
Mezzanine, Hotel Sherman, Chicago, September 15-18



LOWER EXHIBIT HALL

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Alco Products, Inc. ..... 335 to 339
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Barco Mfg. Co. ..... 98 - 99 and 222 - 223 and 260-261
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How the L&N Reclaims Lubricating Pads

. . . Preliminary Tests in 1956 Gave Satisfactory Results

Several hundred package lubricators of all types have been reclaimed by the Louisville & Nashville, including many damaged by eastern Kentucky floods in March 1957. Many contained from 2 lb to 7 lb of water.

The reclamation procedure was perfected in the Test Laboratory in Louisville, Ky., under the direction of J. W. Hebden, chemist and engineer of tests, in conjunction with the Journal Box Servicing Corporation, which has a contract with the railroad for the reclamation of conventional waste packing. The initial reclamation tests began in midsummer 1956. At that time, there were approximately 300 passenger cars equipped with Rolin lubricators which were about due for six-months' repacking. Economically, the lubricators could not be discarded. One hundred of these were removed from journal boxes at repack dates and renovated, using the JBS equipment.

PRELIMINARY TESTS OF RECLAIMED LUBRICATING PADS

Basis of Tests:

- Insoluble impurities obtained on loops on 20 per cent dry basis.
- Tension tests of rubber fillers made on 1-in. x 1-in. x 6-in. specimens, with exception of Miller where a 1-in. wide specimen was taken.
- Cloth specimens were 1 in. wide, and all figures are averages of three pads.

	BEFORE RECLAMATION	AFTER RECLAMATION
Uni-Pak		
Total impurities:		
Top loops, per cent	0.39	0.19
Bottom loops, per cent	0.70	0.23
Tensile strength:		
Rubber, psi	6.6	8.0
Cloth, psi	2068	2150
Oil, Ash, per cent	0.81	—
Insoluble impurities, per cent	0.40	—
Chenille Rolls		
Total impurities, per cent	0.70	0.37
Oil, Ash, per cent	2.96	—
Insoluble impurities, per cent	0.08	—
Rolin		
Total impurities:		
Top loops, per cent	1.24	0.29
Bottom loops, per cent	1.03	0.24
Oil, Ash, per cent	0.78	—
Insoluble impurities	0.15	—
Cel-O-Pak		
Total impurities, per cent	2.15	0.19
Oil, Ash, per cent	0.63	—
Insoluble impurities, per cent	0.38	—
Redipak		
Total impurities, top, per cent	3.21	0.93
Total impurities, bottom, per cent	3.10	0.70
Thickness, ends, in.	—	3 1/8
Thickness, sides, in.	—	3 7/8
Tensile strength:		
Rubber, psi	8	10
Cloth, psi	2000	2176
Oil, Ash, per cent	0.17	—
Insoluble impurities, per cent	0.11	—
Miller		
Total impurities, per cent	2.16	0.41
Height, in.	3 1/8	3 1/4
Tensile strength:		
Rubber, psi	2333	2499

JBS Does the Job

In this process, the pad was removed from the frame and in reassembling, usable parts from other assemblies were available to complete the package. Later, such parts were purchased. Tests of renovated pads indicated the renovated yarns had approximately 95 per cent of the wicking characteristics of yarns from new Rolin pads. As a consequence, renovated Rolin lubricators have been considered the same as new since that time.

A more extended investigation was made in October, 1956. For examples in this test, pads which had been applied at least twelve months, were removed from six captive wheel cars. These pads were renovated at the Louisville plant of the Journal Box Servicing Corporation, the only deviations from equipment used to renovate waste being:

- Pickers were arranged to avoid a tearing action.
- Rollers were set 2-in apart.
- Washing oil was maintained at a maximum temperature of 240 deg, F.

Determining insoluble impurities in the pads called for a new approach. The L&N was familiar with methods employed by other labora-

tories—washing the entire pad in a solvent, and separating loops. However in pads employing loops, any solid matter below the loops which could not possibly come in contact with the journal was not considered. The conclusion reached after a series of laboratory tests was that, when yarns acting as a filter absorb a certain amount of extraneous matter, their wicking abilities are either slowed or completely stopped. Consequently, for laboratory tests on the yarn type filter, insoluble impurities were obtained on loops on a 20 per cent dry basis, such procedure being followed on conventional waste. Cloth covered pads were tested by removing a section of the cloth and calculated on the same basis for comparison.

How the Pads Are Renovated

When lubricator pads are received for renovation, they are checked for wear and tear and gauged for thickness. If wear and tear has been sufficient to damage the pad so it may not function properly, it is discarded. If that part of a pad that is placed under the journal does not have a thickness of proper dimensions, it is likewise discarded.

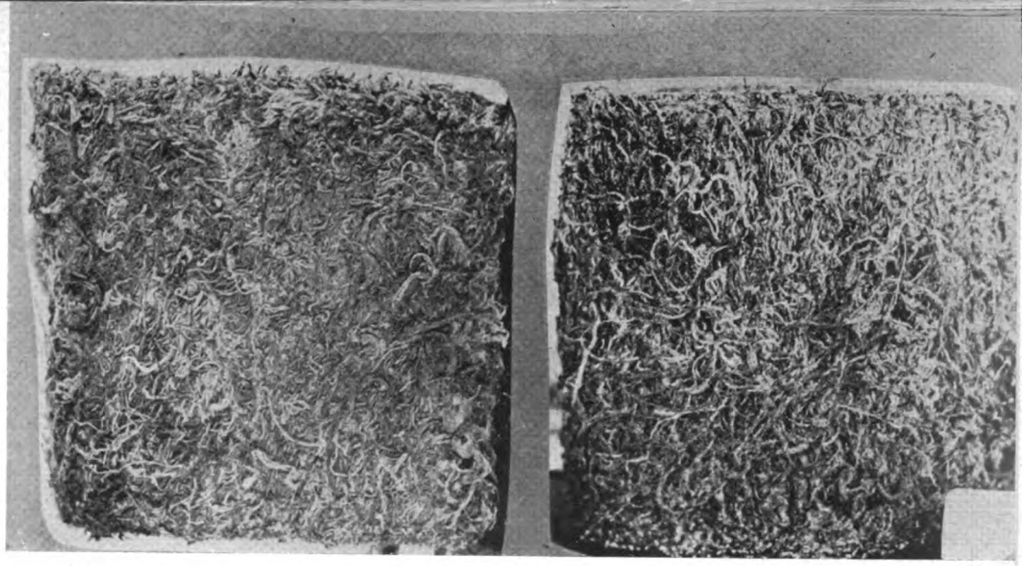
After the pads pass initial inspection, they are placed in a bath of hot oil (temperature limitations based on classes of lubricators) and mechanically carried through one washing machine unit, afterwards passing under a roller where excess oil is removed by pressure.

Pads Are Inspected

The process is then repeated, except the washing unit contains cleaner oil. The pads then go to a machine containing clean oil at about room temperature, where they are saturated and cooled. A final rolling operation removes the excess oil, leaving an oil-lubricator ratio of slightly better than 3.5 to 1 by weight.

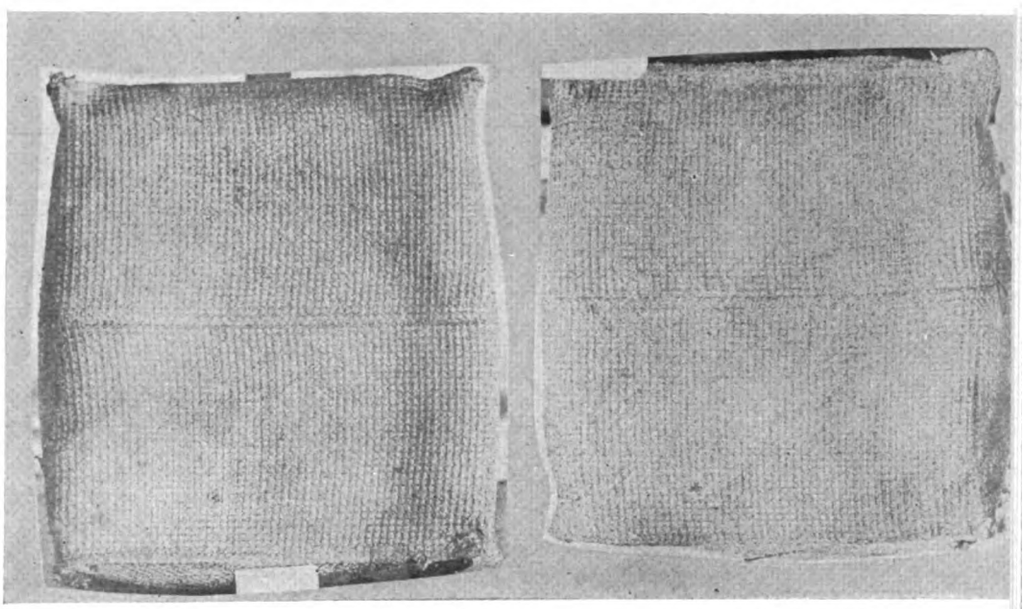
At this point, the pads are given final inspection and placed in barrels for shipment.

The L&N says the above procedures meet the requirements as set forth in the proposed AAR specification M-910A-57 covering the renovation of journal lubricating devices.



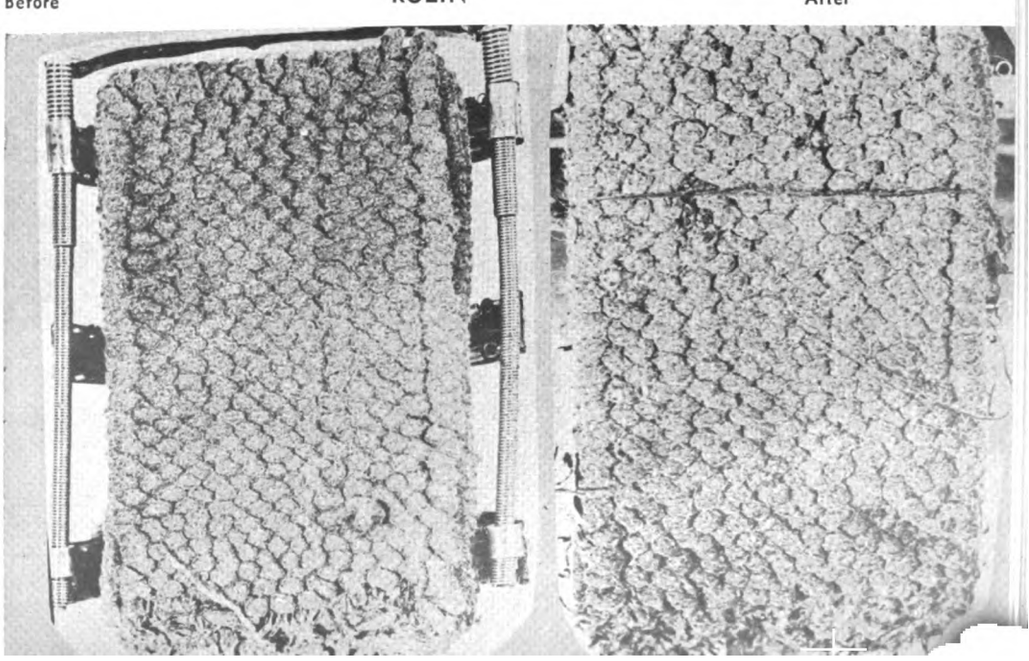
Before MILLER After

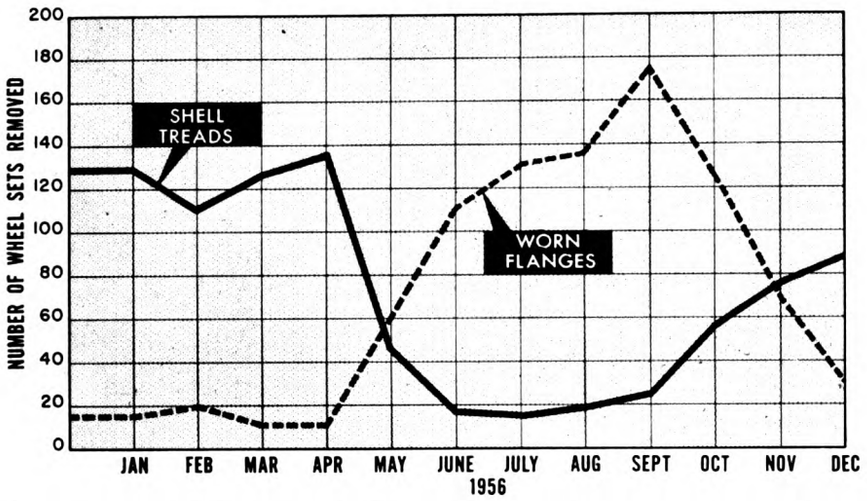
What Renovation Does After 12-Months' Service



Before REDIPAK After

Before ROLIN After





Worn flanges are minor factor in wheel removal figures during winter months when heavy Canadian snow provides flange lubrication. During dry summer months this factor becomes the major reason for removal of wheels from stainless-steel fleet. Worn flanges and shelled treads account for about 90 per cent of removals year around.

With Records and Scheduling . . .

The Canadian Pacific Knows

Part II

Progressive preventive maintenance for 173 stainless-steel Canadian Pacific passenger cars used in transcontinental service requires records similar to those kept by many railroads for diesel locomotives. The program involves inspecting, testing, lubricating and replacing certain components of these Budd-built cars at 120,000-mile intervals. The complete program was detailed in our August, 1957, issue. The aims in setting up the program were to keep the cars on the road and to avoid taking them out of service for back shop work at regular time intervals. The success of the operation has not been due solely to preventive maintenance. In part, it has been due to the mechanical and electrical equipment and to the structural and decorative materials chosen for the cars when they were built.

The mileage intervals originally selected for work on the components were based on Canadian Pacific experience with the same or similar components on its conventional passenger cars. The records set up in Montreal have enabled the office of the chief of motive power and rolling stock to keep an accurate check on all failures and irregularities that occured with each component from the time it was new until it had reached the overhaul mileage originally established. From these records it has been possible to establish what would be the most realistic and economic service life.

Truck Maintenance

Some of these intervals have been increased progressively until the incidence of failures, or the condition of the component on removal, was such that the CPR felt it advisable to drop back to the previous mileage maintenance period to avoid difficulties. Along with the general program, the complete records have provided data which could aid in the solution of special problems such as those of wheel wear and lubrication.

Establishment of the proper interval for truck overhaul is an example of the way the mileage maintenance program has developed. There are 346 of General Steel Castings' four-wheel, outside-swing-hanger trucks under the 173 cars. In addition, the CPR has six spares —three in Toronto and three in Montreal. No attempt is made to equalize mileage on the cars, and the Toronto — Sudbury sleeper makes about 10,000 miles per month while the transcontinental cars average nearly 25,000 miles in the same period.

When ten of the trucks had accumulated 360,000 miles of operation, they were dismantled and inspected in cooperation with Budd

What Today's Equipment Will Do

engineers. Measurements were made of pin wear, bushing wear, and of other parts — all the conditions which would eventually dictate the necessity for rebuilding. These same ten trucks were again inspected when the cars reached 480,000 miles along with 56 other trucks which were dismantled, inspected, measured and then rebuilt. The ten trucks which were being used to determine progressive wear figures did not receive new pins and bushings, but were put back into service in their original condition each time to yield the additional data which the CPR wanted for making its final decision. Condition of the ten trucks

CANADIAN PACIFIC RAILWAY COMPANY

OFFICE OF CHIEF OF M.P. & R.S.

M.P. 617

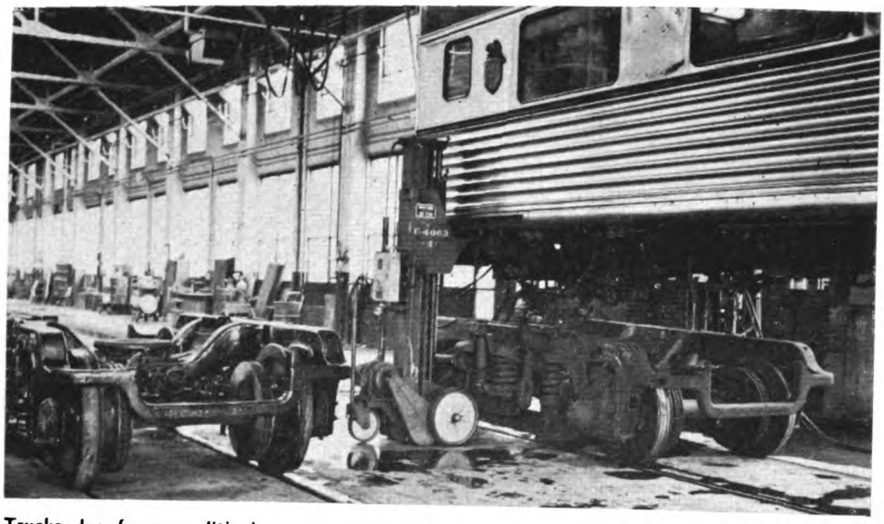
JANUARY, 1955

MONTHLY WHEEL REMOVAL RECORD ON STAINLESS STEEL PASSENGER CARS

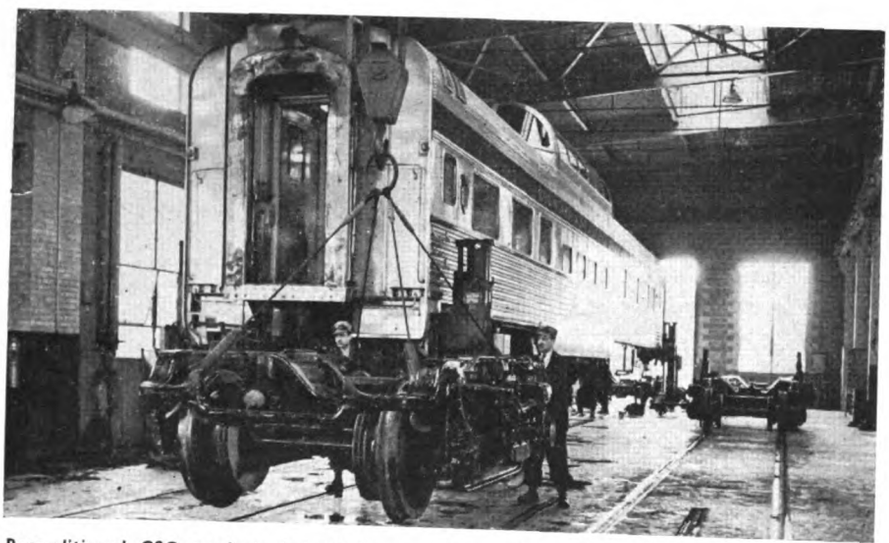
MONTH OF November 19 56 STATION Toronto Union FOREMAN A.E. Ind. General Car Foreman

CAR NAME OR NUMBER	DATE OF WHEEL CHANGE	PEDESTAL LOCATION	REMOVED WHEEL NUMBERS	REASON FOR REMOVAL	REMOVED ROLOKRON NO.	ROLOKRON SETTING WHEN REMOVED	INSTALLED WHEEL NUMBERS	ROLOKRON NO. INSTALLED
Alexandra	Nov. 16th	R&L-4	71951 - 71969	Rule PC7-74T	B-4040	.030	43532 - 43533	B-3974
Roger Manor	" 17th	R&L-4	3017 - 3096	" " 71S	B-3043	.030	211 - 217	B-4040
Chateau LeMoyne	" 17th	R&L-3	36783 - 48026	" " 71S	BB-4511	.030	72204 - 72226	B-3174
3010	" 18th	R&L-1	46051 - 47977	" " 71S	B-3272	.030	3080 - 3063	B-3043
Monok Manor	" 18th	R&L-4	9390 - 9302	" " 74V	B-3180	.030	72032 - 72041	B-3823
Monok Manor	" 18th	R&L-3	9316 - 9306	" " 74T	B-3948	.030	72028 - 71982	BB-4511

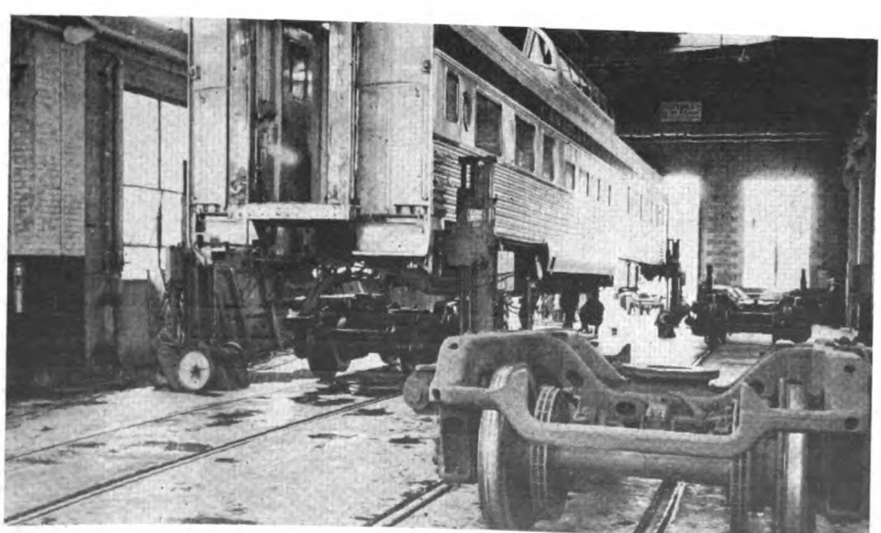
Why CPR knows what occurs with all of the components of its stainless-steel equipment is due to regular reports such as this one covering reasons for the removal of wheels at Toronto coach yard.



Trucks due for reconditioning are ready to be rolled out from under dome coach after the body has been raised on four Whiting 35-ton jacks.



Reconditioned GSC truck is hoisted into position to be put under car replacing one just removed. It is scheduled to run 600,000 miles.



Ready to lower, trucks are under dome car. CPR extended Montreal coach shop, installed 15-ton overhead crane, to service its streamliners.

after they had operated 600,000 miles determined the overhaul period for complete truck rebuilding.

Now when a car is posted for 600,000-mile work, trucks are readied for it when it is due in at its assigned terminal—either Toronto or Montreal. The partially rebuilt trucks are held in readiness at these points at all times. Once it is known which car is coming in for work, it is only necessary to apply the proper springs and brake cylinders to complete the trucks for the car. Cars vary in weight from 119,100 lb for the baggage-dormitory car to 145,400 lb for the dome-lounge car. The various types of cars require trucks with one of two sizes of disc brake cylinders, and with different combinations of the ten types of equalizer springs and eight sizes of bolster springs. These cars operate over hundreds of miles of line with sharp curves and heavy grades. Particular attention is paid to truck maintenance.

Wheel Life

Wheel maintenance is a separate matter. The CPR has a cumulative history of each of the wheel assemblies used under the stainless-steel cars. Each coach shop reports wheel changes made during each month, and the reasons. Angus shop scraps all wheels—not only those removed at Montreal but those that come out at other points. There are 692 wheel sets under the 173 cars, and an inventory of 100 spares is maintained. Montreal, Toronto and Vancouver all have drop pits for changing wheels.

However, cars dispatched from the two eastern terminals are supposed to have enough flange thickness to make the 5,800-mile round trip. This is done to avoid changing wheels at Vancouver since it is inconvenient to break the train up during cleaning and to switch cars to the Vancouver drop pit track. Cars have a minimum flange thickness of 1-in. when they leave Montreal or Toronto so that 1/16-in. of material will be available for the round trip.

The unusually complete records for these multiple-wear, wrought-steel wheels have produced much useful information. For example, accurate figures have been compiled showing comparative mileages being obtained from wheels on both disc-brake and clasp-brake equipped

WHEEL CHANGE-OUT RECORD FOR MONTH ENDING September 31st, 19 56

STAINLESS STEEL PASSENGER CARS

SERIES	No. of Wheel Change-outs during month	NO. OF WHEEL CHANGE-OUTS FOR EACH SERIES OF CARS AND REASON FOR WHEEL REMOVAL. ALSO PERCENTAGE OF DEFECTS FOR EACH SERIES TO TOTAL OF 214 CHANGE-OUTS SHOWN FOR MONTH												AVERAGE MILEAGE OBTAINED PER WHEEL CHANGE-OUT FOR MONTH SHOWN	REMARKS
		Shell Tread		Worn Flange		Skid Flat		Worn Tread		Built-up-Tread		Other Defects			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Baggage - Dormitory 3000 - 3017	14			13	6			1	.5					70,630	
Dome Coaches Skyline - 500 - 517	26	1	.5	23	11	1	.5	1	.5					50,508	
DeLuxe Coaches 100 - 129	33	4	2	29	13									110,181	
Diners	19	4	2	14	6			1	.5					71,281	
Roomette Sleepers Manor Series	45	4	2	37	17	1	.5	2	1			1	.5	60,221	
Duplex Roomette Sleepers Chateau Series	42	4	2	36	17			2	1					46,722	
Dome Observation-Lounge Park Series	35	7	3	23	11	1	.5	4	2					43,126	
															Total Mileage Wheels removed during month 13,474,187
TOTALS FOR MONTH	214	24	11.5	175	81	3	1.5	11	5.5			1	.5	AVERAGE MILEAGE PER WHEEL CHANGE-OUT FOR MONTH 62,963	

TOTAL NO. OF WHEEL CHANGE-OUTS TO DATE

ALL CARS IN ALL SERIES	Total No. of Change-outs	Shelled Tread		Worn Flange		Skid Flats		Worn Tread		Built-up-Tread		Other Defects		AVERAGE MILEAGE OBTAINED PER WHEEL CHANGE-OUT	REMARKS
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
	3418	1635	47.9	1383	40.5	38	1	139	4	2	.1	221	6.5	62,877	

OFFICE OF CHIEF OF MOTIVE POWER AND ROLLING STOCK — AUGUST 1955.

Wheel study on stainless-steel passenger cars yields exact data on distribution of wheel defects, and permits comparison of various types and weights of cars. Report is compiled monthly.

trucks. In addition, mileage performances obtained from different classes of wheels and with those from various manufacturers are available when specifications for purchasing new wheels are made up.

Shop Loads

The entire preventive maintenance program for the 173 cars is divided between Toronto and Montreal. During the last quarter of last year, the preventive maintenance program involved each of these terminals handling from 6 to 14 cars per month. The shop loads and classification by the type of mileage maintenance performed are shown in the table below.

No attempt is made to concentrate this work in off seasons. The "Canadian" cars arrive at their maintenance terminals once each week and it may take two or more of these visits before all of the preventive maintenance items are completed. Cars are not held out of service for the work.

Centralized record keeping enables the CPR to keep close check on the rates at which materials are used in operating these 173 cars. Accurate predictions on the use of wheels are important because it is necessary to anticipate this consumption a year in advance.

The information from the Kardex records is also valuable in assisting in the preparation of the maintenance budgets. The 1956-1957 budget items covering maintenance of these 173 cars were, in part, based upon estimates of the man-hour and material requirements involved in the preventive maintenance program. The entire program anticipates that there should be little additional mechanical work necessary that has not been anticipated in advance. Knowing what will be done, and when, has been useful.

Already some cars are approaching their 720,000-mile inspections. All of the servicing and maintenance are aimed, not at obtaining exceptional component life, but at insuring reliable, trouble-free operation of the cars while providing comfortable trips for CPR passengers.

Month	Montreal	Toronto
October 1956 Total: 15 cars	5 Cars—480,000-mi. 4 Cars—600,000-mi.	1 Car —240,000-mi. 1 Car —360,000-mi. 4 Cars—480,000-mi.
November 1956 Total: 17 cars	3 Cars—360,000-mi. 4 Cars—480,000-mi. 3 Cars—600,000-mi.	4 Cars—360,000-mi. 3 Cars—480,000-mi.
December 1956 Total: 27 cars	6 Cars—360,000-mi. 5 Cars—480,000-mi. 2 Cars—600,000-mi.	2 Cars—240,000-mi. 7 Cars—360,000-mi. 4 Cars—480,000-mi. 1 Car —600,000-mi.

How's Hydracushion Doing?

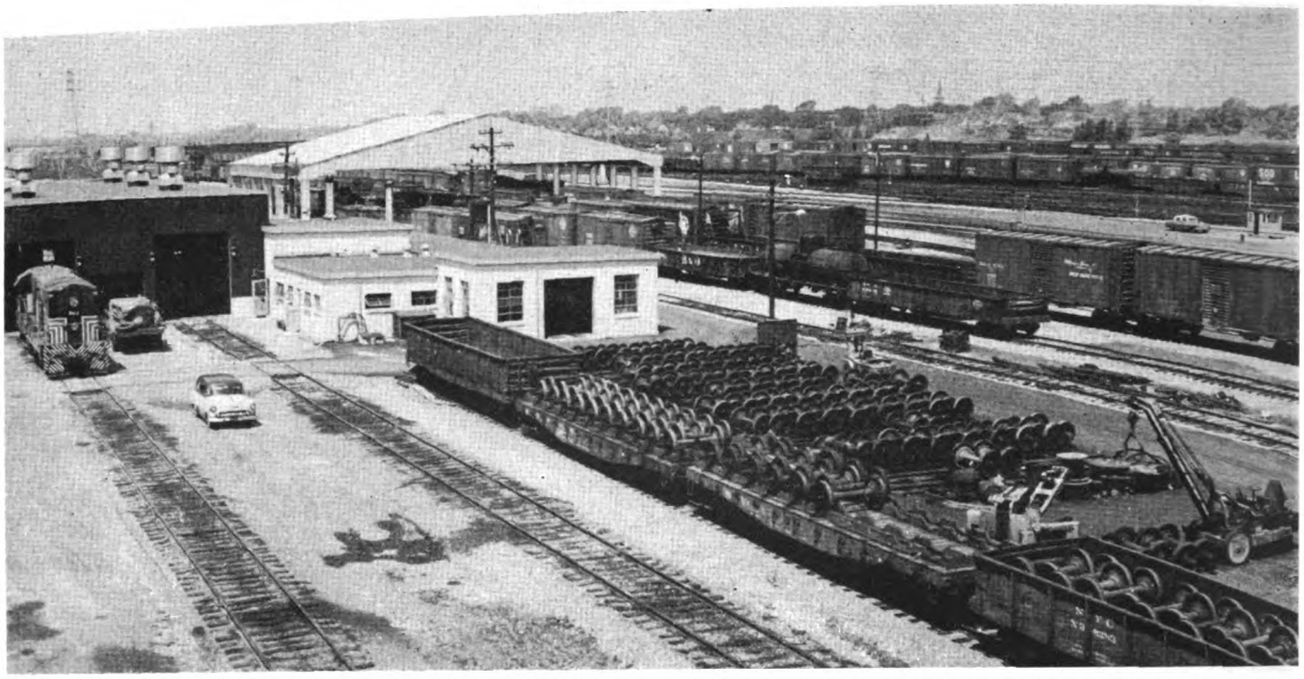
S. M. Houston, Southern Pacific, recently told of his railroad's experience with the hydracushion underframe (*RL&C*, May, 1957, p 53). It was pointed out this type of underframe design was chosen because it provides the travel necessary to achieve low car body accelerations at high impact speeds with a high capacity absorption device. Said Mr. Houston, "These requirements could not have been obtained if we had limited ourselves to the travel provided by a standard draft gear pocket."

Hydraulic buffers developed in the past were of the direct acting type which offered little improvement over existing gears and involved a major maintenance problem in fluid leakage. Hydracushion is not direct-acting, energy is not absorbed by transfer of hydraulic fluid, and fluid pressures do not exceed 800 psi. Cushioning capacity variable depending on the speed and severity of impact.

With two fully loaded 50-ton cars impacting at 10 mph, the hydracushion device develops approximately 250,000 ft lb capacity with sill loads of around 400,000 lb. Southern Pacific car 650803 with the hydracushion underframe has made 10 trips from Toledo, Ohio to the west coast automobile assembly plants, hauling curved windshields, and without the breaking of a single piece of glass.

To compare with regular cars, during March, 1956, the railroads handling this glass paid claims of $11,274 on these shipments, with SP's proportion being $4,498. During 1955, the GM plant in Los Angeles received 319 carloads of auto glass. From these, there were 246 claims, amount-

(*Continued on page 52*)



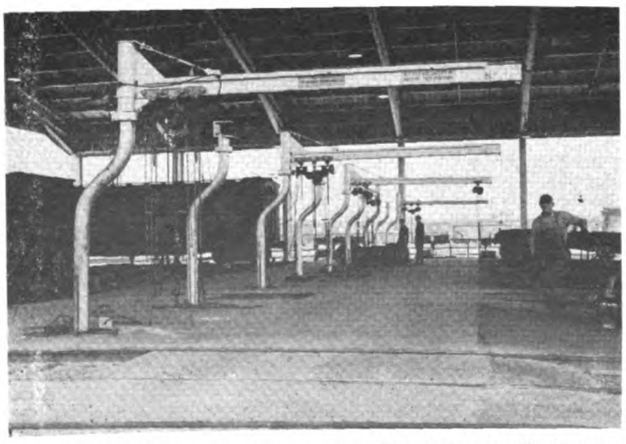
Car repair buildings are at west end of Frontier yard with locomotive repair and servicing facilities. Car wheels are handled from wheel tracks or from the small wheel shop with crane or lift trucks. Facility is pattern for future installations.

NYC's Most Modern Yard Gets . . .

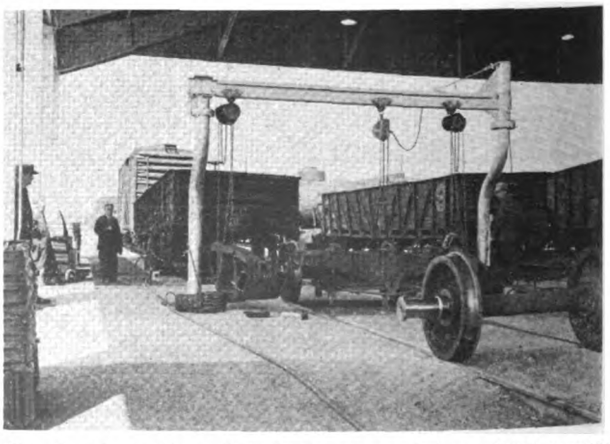
'Progressive' Car Repair Facilities

The 5,800-car Frontier Yard at Buffalo, N. Y., is the New York Central's most modern. From last February—when it went into operation—until the end of June, it had a conventional type 5-track light freight car repair facility. A long, one-story concrete block structure at the south side of these five tracks contains the stores facilities, wood mill, a blacksmith shop, an oil room, air room, a wheel shop, locker rooms and offices. The wheel shop has only a journal lathe; other wheel work is done at the NYC's central wheel shops.

Even before the big yard was complete, plans were stated to put in the "progressive" or "spot" scheme for light car repairs. It was almost July before the open-sided car repair shed and all of the necessary equipment could be installed. Then within only a few weeks, Buffalo yard's light repairs went from a one shift to a two shifts, and finally, to round-the-clock operation. Car delays are reduced, car availability is increased, and customers get shipments sooner.



A-frames at each of five tracks are pedestal cranes which swing into stanchions for use. Shop has mercury-vapor lighting.



One electric and two chain hoists are on A-frame. Retainer over bolster holds brake beams; only one side frame need be removed.

Buffalo yard has been classifying about 3,000 cars daily, and from these come 40 to 50 cars which are bad ordered or are due for periodic lubrication or air brake work. These cars are found by inspectors working along the hump, and are classified into an assigned track in the yard.

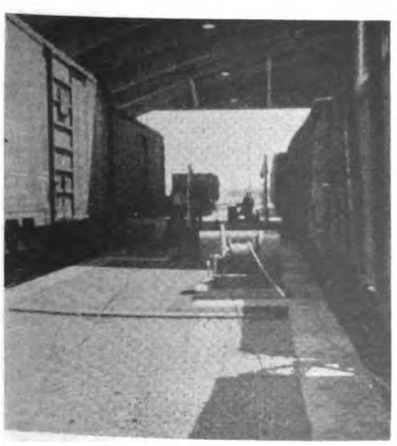
All Repairs Speeded

At frequent intervals they are moved to the inbound tracks at the repair facility. Even with this speedy handling, not all work is done on repair tracks. NYC has a station wagon to get car repairmen, necessary tools and material to disabled cars in the yard. Work of this type includes adjusting and rebanding some loads, straightening some safety appliances, and repairs to broken train lines.

Only classification on the inbound tracks at the car repair area is to place the heavy repair cars on Track 5. All other cars are worked as delivered, irrespective of defects. Principal work handled on the other four tracks is mainly journal repacking, brake cleaning and wheel changes.

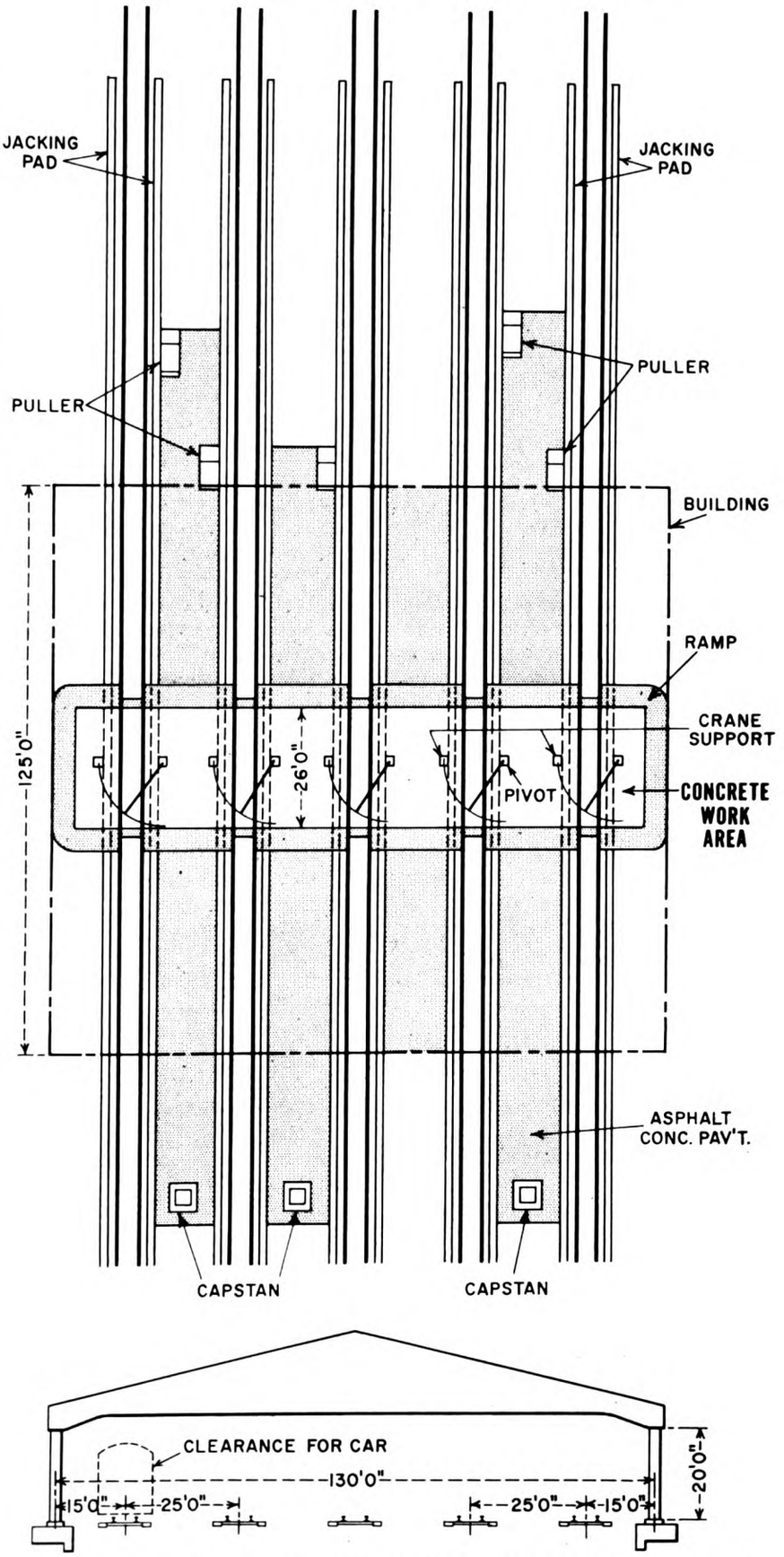
The crews are usually two men assigned to each track with air brake men, welders, oilers and laborers working at various locations in the shop as required.

Cars are pulled in from inbound tracks with winch-type car pullers and moved on the outbound side with ropes over capstans. This new installation is to be duplicated at Youngstown, O., and Elkhart, Ind., in new yards now under construction.



Car puller with steel cable moves several coupled cars into repair shed.

This Is Repair Area for 5,800 Car Yard



Corrugated metal structure covers five tracks. Air, 110-V and 220-V a-c are installed now. NYC later plans to pipe in oxygen and acetylene. Work and locker rooms (not shown) are at left.

How's Hydracushion Doing?

(*Continued from page 49*)

ing to $104,311—an average claim per car of $326.99. Of the 349 Hydracushion cars now being built, 54 will go into glass service and the remainder will be in general service. The SP is negotiating rights for the building and selling of hydracushion underframes under its license.

Hydracushion performance was reported by SP's general superintendent motive power to the recent AAR Mechanical Division meeting during a discussion of the report of the Committee on Couplers and Draft Gears. A report was made by a Sante Fe representative on his road's experience with long travel draft gears indicating that they have also been successful in reducing forces developed during impacts.

The Committee has requested the Mechanical Research department to secure authority to conduct impact tests on various draft gears and cushion underframes to evaluate their performance in protecting lading. This is to enable the railroads to evaluate the types of gears which give maximum protection to lading and to determine the overall cost. These are to resolve different results reported by draft gear manufacturers. The Committee states "it would seem logical to assume that present day train speeds, train lengths, and switching speeds . . . . have about reached the maximum that is permissible." New equipment is now being calibrated for the official draft gear capacity tests.

The Committee is taking steps to require that all reconditioned draft gears successfully pass the AAR tests before application to any car. Previously, Interchange Rule 3 specified that "untested" gears could not be applied to foreign cars. Said the Committee, "There should be no difference between system and foreign cars in the minimum protection required for lading . . . . more care will have to be exercised in the use of second hand gears."

Wear in draft gear attachments during the first two years of service had led the Committee to recommend that the specification for rubber gears require not less than 4,500 ft lb capacity at 1$\frac{5}{16}$-in. travel. The wear in the draft gear key, yoke and associated parts may be due to the initial travel of some present rubber gears being "too soft". During the year, the Committee has placed three gears on the list of "non-approved" types and their manufacture has been discontinued. During the past year, the Cardwell Westinghouse Mark 40 and the Peerless Type T-1 received conditional approval and 6,000 gears of each authorized for application.

Suggestion that spring-type coupler carriers under E couplers be prohibited in interchange was considered by the Committee, and it was decided that their was no justification for this action. The Committee is recommending that couplers for "other than steam" locomotives be reduced to four basic types.

BLH Building Free-Piston Gasifiers

(*Continued from page 41*)

diesel-powered. According to Baldwin, the free piston engine surpasses the diesel in these respects:

- Has a much greater power-to-weight ratio—more power in a smaller size.
- Burns a wider range of fuels. A diesel can burn efficiently only diesel and residual oils.
- Can be combined so that multiple gasifiers supply one turbine to provide a wide range of power outputs.
- Provides high-starting torque, controlled variable speed and reversibility without using the more bulky and costly transmissions and torque converters.
- Service and maintenance costs are expected to be far less than that for diesels.

The Hamilton FP-165 engine surpasses the open-cycle gas turbine, long held to be the most desirable substitute for the diesel in most applications, in these respects:

- Consumes half as much fuel at full load; uses substantially less than half as much at low loads and at idling speed.
- Decelerates much faster. Requires no high-speed high-inertia compressor on the shaft that supplies output power.
- Operates at temperatures of approximately 1,000 deg where ordinary steels can be used. The open-cycle gas turbine operates in the 1,500-deg range, where special steels must be used.
- Provides immediate high-torque characteristics. The gas turbine rotor must be operating at high enough speed to operate its integral compressor before it can supply high torque.
- Gasifiers can be stacked or combined to supply one turbine and afford a wide range of horsepower output.

BLH Plans Production

From the results obtained with free piston engines, Hamilton Division of B-L-H believes that use of free piston machinery soon will be widespread. The firm also states that large expenditures on further research and development for facilities to produce large quantities of the machines are warranted. In addition to its free-piston engine development, BLH is now engineering an all-service type of diesel-hydraulic locomotive. This unit, according to McClure Smith, BLH president, would be a larger version of the Mec-Hydro locomotive now operating on the New York Central (*RL&C, June 1956, p. 58*). He went on to predict that the study of compact atomic power plants would be concluded late this year. This will examine the feasibility of units which could be used for mobile power plants and locomotives.

The study of atomic energy for railroad applications has been carried on cooperatively with the Denver & Rio Grande Western under a contract with the U. S. Atomic Energy Commission.

In addition to Baldwin, it is known that General Motors is working on a 2,000-hp free-piston, gas-turbine-electric locomotive. In Europe there is a 1,000-hp unit with mechanical drive operating on the French State Railways. Two larger units also have been designed for European service.

HOW TO

Learn About Air Brakes

... AND HAVE FUN DOING IT

24-RL Automatic Brake Valves — *Installment 1F*

D-24 MC Pressure Maintaining Brake Valve

This is the sixth installment on the 24-RL Equipment in the Air Brake in Color Schematics series. For the 1E installment see Page 57 of the May, 1957, issue.

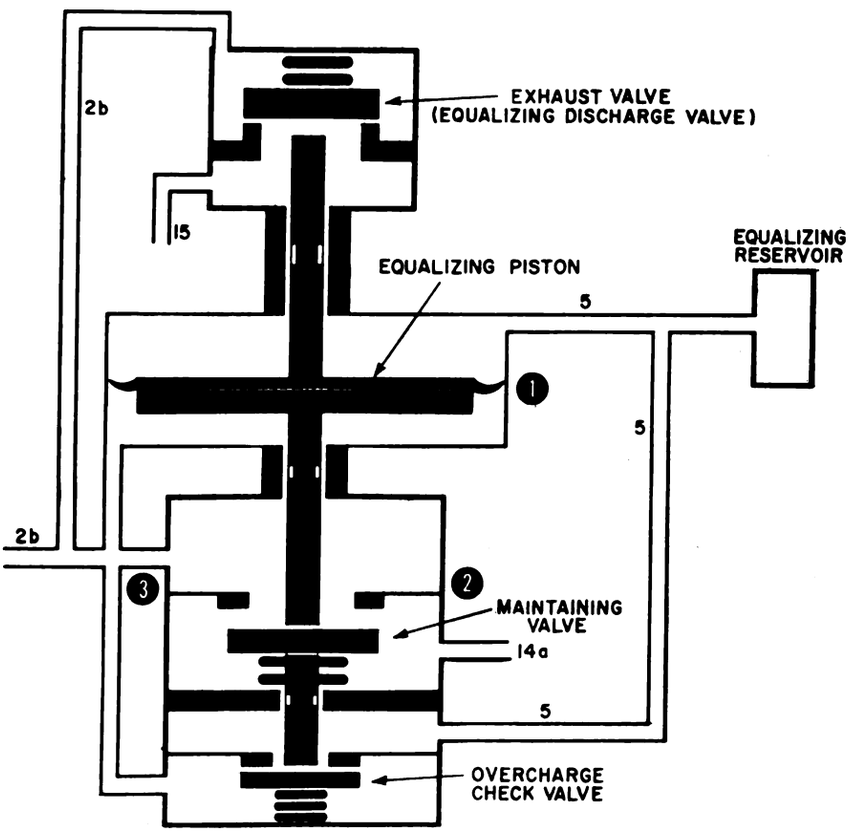
Operation at Equalizing Portion During Pressure Maintaining (Sketch 15)

If the pressure differential across the diaphragm increases due to brake pipe leakage, the diaphragm assembly is moved downward until the maintaining valve plunger unseats the maintaining valve. Feed valve air flows to brake pipe passage *2b* by way of passage *14a*, the strainer, the maintaining supply choke, and the open maintaining valve. The maintaining valve thus meters feed valve supply air as long as there is brake pipe leakage. The maintaining supply choke, located above the strainer, controls the amount of leakage that the feed valve is permitted to maintain.

To color sketch 15, proceed as follows: With a yellow pencil fill in the space above the exhaust valve, and fill in passage *2b*, the space above the maintaining valve seat and the chamber beneath the equalizing piston. Continue down the passage and fill in the chamber below the overcharge check valve. Fill in the space below the exhaust valve and passage *15* in yellow dashes. Dampen and allow to dry before proceeding on the next coloring operation.

With an orange pencil, color passage *14a* and the space below and above the maintaining valve, joining with the yellow color above the maintaining valve seat. Dampen and allow to dry.

With a light green pencil, color the space above equalizing piston (chamber D), passage *5*, equalizing reservoir, and the space above the overcharge check valve. Dampen and allow to dry.



Sketch 15

Operation at Equalizing Portion During Pressure Maintaining

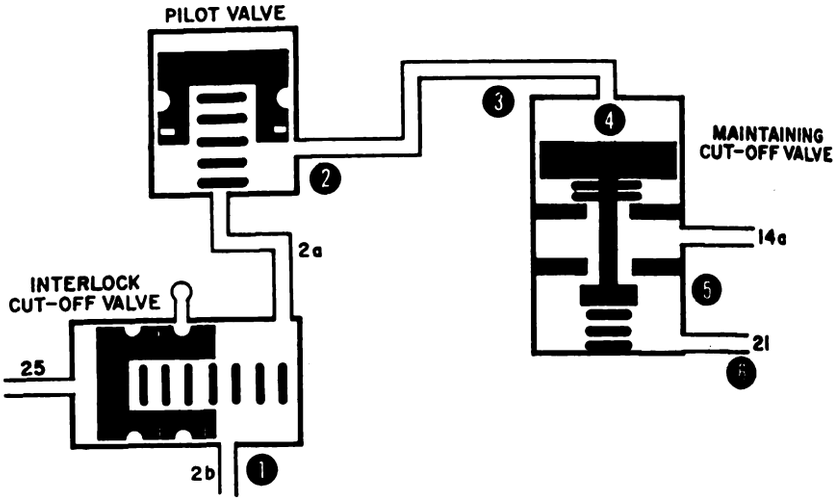
1. Due to broke pipe leakage, higher equalizing reservoir pressure forces equalizing piston downward.
2. Piston stem unseats maintaining valve.
3. Maintaining air flows from passage 14a past the open maintaining valve to brake-pipe passage and to brake pipe.

Maintaining Cut-off Assembly In Operation (Sketch 16)

On the D-24 MC type brake valve, the maintaining cut-off valve is located on the filling piece portion. This valve provides manual and automatic control of the pressure maintaining feature. When its handle is turned to *IN* position, brake pipe air is allowed to flow through the open pilot valve to the face of the maintaining valve piston. The downward movement of the piston unseats the check valve and connects feed valve passage *21* to maintaining passage *14a*.

To color this sketch, proceed as follows: With a yellow pencil fill in passage *2b*, the spring chamber at the right of the interlock cut-off valve, passage *2a*, the space beneath the pilot valve, the passage leading to the maintaining cut-off valve and the space above the piston. Dampen and allow to dry.

With an orange pencil, color passage *21*, the chambers below and above the check valve and passage *14a*. With a carmine pencil color in dashes, passage *25* and the space at the left of the interlock cut-off valve. Dampen and allow to dry.



Sketch 16

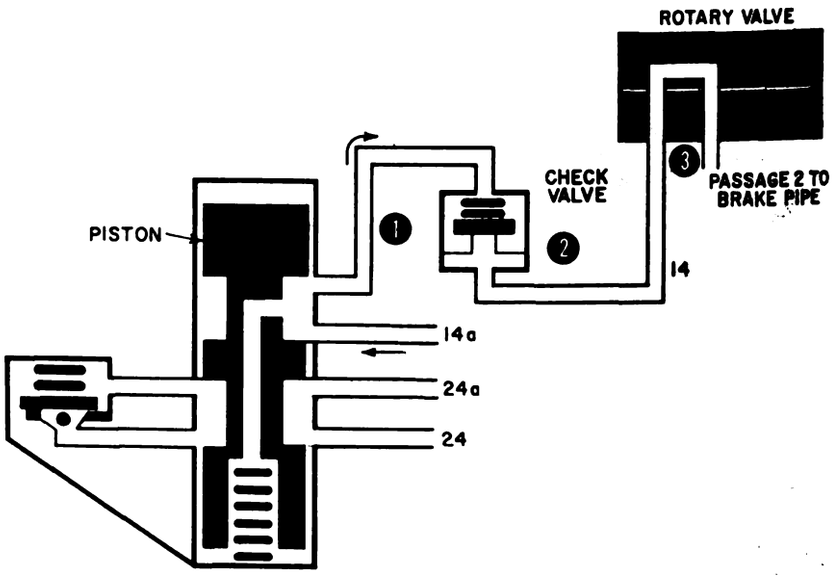
Maintaining Cut-Off Assembly in Operation.

1. Brake-pipe pressure enters Interlock Cut-Off Valve.
2. Brake-pipe air passes through the Cut-Off Valve and enters Pilot Valve.
3. Pilot Valve Piston moves upward and brake-pipe air flows past pilot valve to chamber above Maintaining Cut-Off Valve Piston.
4. Piston moves down.
5. Piston stem opens Maintaining Cut-Off Valve Check Valve.
6. Feed-valve air from passage 21 flows past open check valve to passage 14a.

First Service Cock Assembly During Pressure Maintaining (Sketch 17)

To color this sketch, proceed as follows: With a yellow pencil, color passage *2* through the rotary valve, and passage *14* to the underside of the check valve. Dampen and allow to dry. With an orange pencil, start above the check valve filling in the passage and the cavity around the piston, down through the center of the piston including the spring chamber. Fill in passage *14a* leading out of the piston cavity.

With a dark green pencil, color in dashes passages *24* and *24a*, the cavity around the piston, and the passages to and including the space above and below the left hand check valve and ball. Dampen and allow to dry.



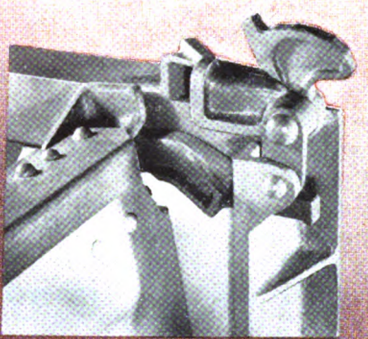
Sketch 17

First Service Cock Assembly During Pressure Maintaining. Brake Valve in LAP Position Following a Service Reduction.

1. Maintaining pressure flows from passage 14a through First Service Piston to chamber over check valve.
2. Check valve closes and prevents flow to passage 14 and 2.
3. Passage 14 is connected through rotary valve to brake pipe via passage 2.

INCORPORATED DROP-END UNITS

Speed Service..
Sustain Structure



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AND ONE MAN OPERATION

WINE

Drop End Locks
and
End Balancers

THE WINE RAILWAY APPLIANCE COMPANY
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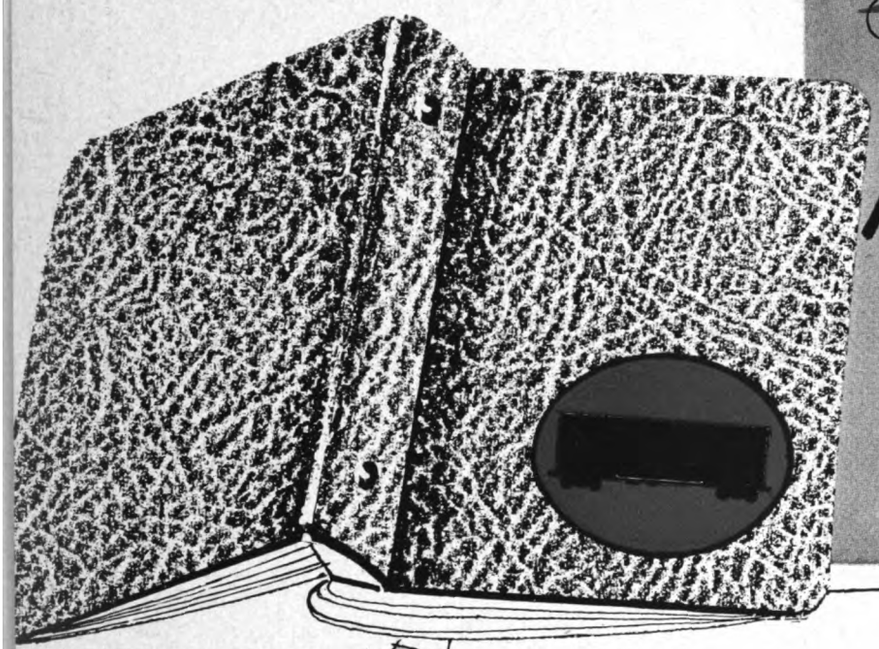

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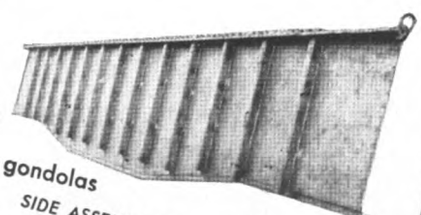

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4 Roll Them Out Like New

Cleaning Electric Machinery

It's A Broad Field

STRANGE AS IT MAY SEEM there is no one best way to clean electric machinery. But, as in so many other maintenance practices, the search goes on. More is being learned about the subject, and methods and equipment are being perfected every day. What is good in one case may not suit at all in another. There are good reasons for the many cleaning methods and materials now available, because cleaning methods and materials change with conditions. For instance, a large continuous volume of work may justify an elaborate, expensive cleaning installation, while a bucket and hand brush will do nicely for just a few parts.

The steady demand for increased power and performance causes changes in design and construction of machinery. As an example, rollers replaced sleeve motor bearings, gaining space for additional active material. Working this material harder raised the operating temperature of the machines. All this created new maintenance problems. Especially important to cleaning, are changes in electrical insulation. As operating temperatures increased the Class A organic materials, such as paper, cotton and shellac gave way to the Class B inorganic materials, such as asbestos and mica. Today the higher temperature Class H synthetic materials, such as silicones and Teflon are available. Each new material brings new strength to the job. But it also has weaknesses which must be learned and overcome.

New developments in cleaning are keeping pace with this evolution of materials. The bucket and hand brush give way to solvent sprays, the steam jet and detergents. More recently, the vapor degreaser and various abrasive blast systems have been added to the list. Now ultrasonic vibration cleaning methods are coming into use. All these, together with the ever-increasing line of chemical and mechanical cleaning materials, make a wide and bewildering field from which to choose. You can select whatever best suits your need. Each has its good points and weak points. No wonder there are strong differences of opinion. This is to be expected where facts and experience are being accumulated and are not always readily obtainable. Time and study are needed to make the proper choice. Some shops have several cleaning methods and use each on the jobs where it gives the best results.

One way to study this variety of cleaning methods is to start at the beginning and examine the fundamentals a step at a time. This will help make clear why certain methods are used. When the *why* is understood, the *how* to do a given job will be easier to judge and select.

First Clean the Outside

When a piece of equipment is removed from service the outside is likely to be the dirtiest part. This is particularly true of traction motors that operate under the locomotive only a few inches above the roadbed. Whenever possible, most of this dirt should be removed before the equipment enters the repair area of the shop. Where the climate permits, this job is often done outdoors. If it must be done inside, use a separate cleaning room arranged so that the dirt removed from the equipment will not spread to the rest of the shop. Fortunately, this dirt is easy to reach and remove because it is on the outside of the equipment. Also, a clean exterior makes it easy to disassemble the equipment by exposing the bolts and locking devices. Furthermore, it helps keep the repair shop clean and reduces the danger of contaminating good equipment with dirt brought in from the field. This will also keep the bulk of the dirt out of the specialized shop cleaning equipment and solvents.

This outside dirt may be removed by any one of several methods. Steam jets with detergents, Fig. 1, are often used for this job. Railroads have used this cleaning method for years. Another way of removing this dirt is to use solvents and scrapers. Dry abrasive methods have also been tried. These scrub the dirt off without using water or solvents.

A good precaution during cleaning is to keep the inspection covers on, and to close off all air inlets into the equipment. This will keep the loosened dirt and the caustic or solvent cleaner out of the machine. If these get in they can damage brushes and exposed insulation. Here's how it happens. The outside of the motor dries off rather quickly in the air. The inside stays wet longer, especially if it is closed up for a trip to the shop. Under such conditions brushes, springs and commutators remain mucky and chemicals act upon and penetrate insulation.

In this way, healthy motors have been damaged after removal by well intended but careless exterior cleaning. All this presents special problems for the shop to correct. Such contamination may also destroy evidence and interfere with finding the cause of defects. For these reasons care should be exercised when cleaning work is attempted at running maintenance points. If it's going to be done there it should be entrusted to a trained, reliable man who has been instructed in the proper precautions.

(*Turn to page 58*)

This is the fourth article in a new series covering heavy maintenance of locomotive electrical equipment. It is written by J. W. Teker, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

Fig. 7—For small jobs, cleaning solution can be applied with a bucket and brush.

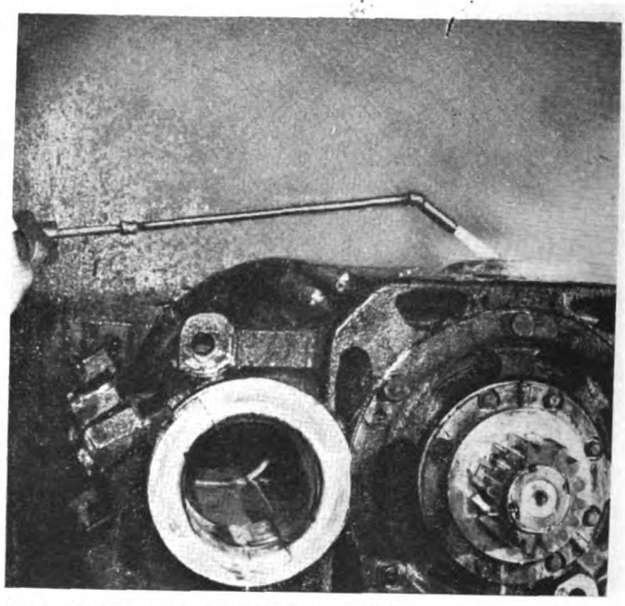


Fig. 1—Outside dirt should be removed before equipment is disassembled.

After the exterior has been cleaned, equipment is brought into the shop. The outside dirt has now been removed so you can read the nameplate and get information for record purposes. Routine measurements and inspections can be made without struggling with dirt.

When the machine is dismantled we have a variety of parts. They can be divided into two classes: parts that are wholly metal and parts that are a combination of metal and electrical insulation.

Metal parts, such as pinions, gears, gear cases and frameheads are sometimes all put through the same cleaning process. If caustic and hot water or powerful solvents are used, remember that every trace of oil film may be removed from the highly finished machined surfaces. If these are left exposed to the air without proper protection they will begin to rust right before your eyes. For this reason precision finished parts having highly polished surfaces like roller bearings are often separated from the others and given different treatment. They can best be cleaned in a separate room, handled individually, and immediately dipped in light oil after cleaning. Then they can be inspected and defective ones rejected. Those that pass inspection can be suitably protected and stored for future use.

Remember that carbon brushes may be seriously altered when put through some cleaners. Although they appear the same they will not perform the same. The cleaning can remove certain necessary ingredients of the brush composition. Also, brushes are like sponges and will soak up cleaner if they are dipped in it. After such treatment they are never the same, even though the trade mark is still stamped on them. The contamination can be enough to change both their mechanical and electrical performance. So, when cleaning brushes, scrape the muck off and wipe the brush with a cloth dampened with evaporating solvent. Do not soak or dip the brush in cleaner. Many brushes

(*Continued on page 62*)

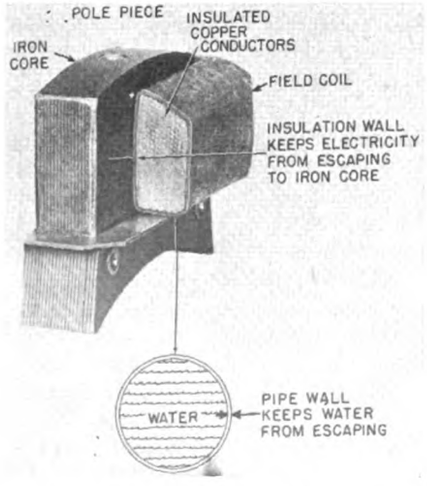


Fig. 2—Insulation is like the wall of a pipe.

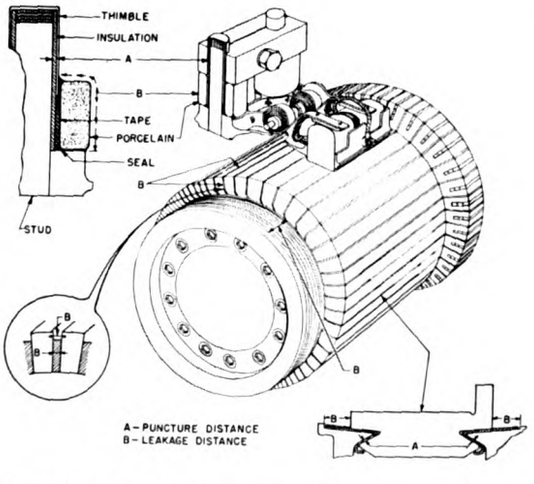


Fig. 3—Location of creepage surfaces on commutator and brush holders.

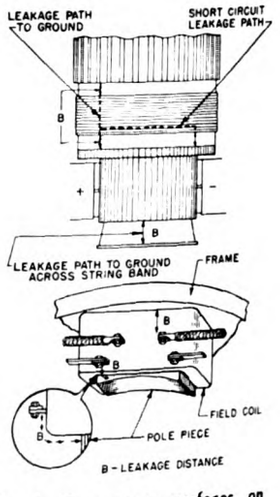
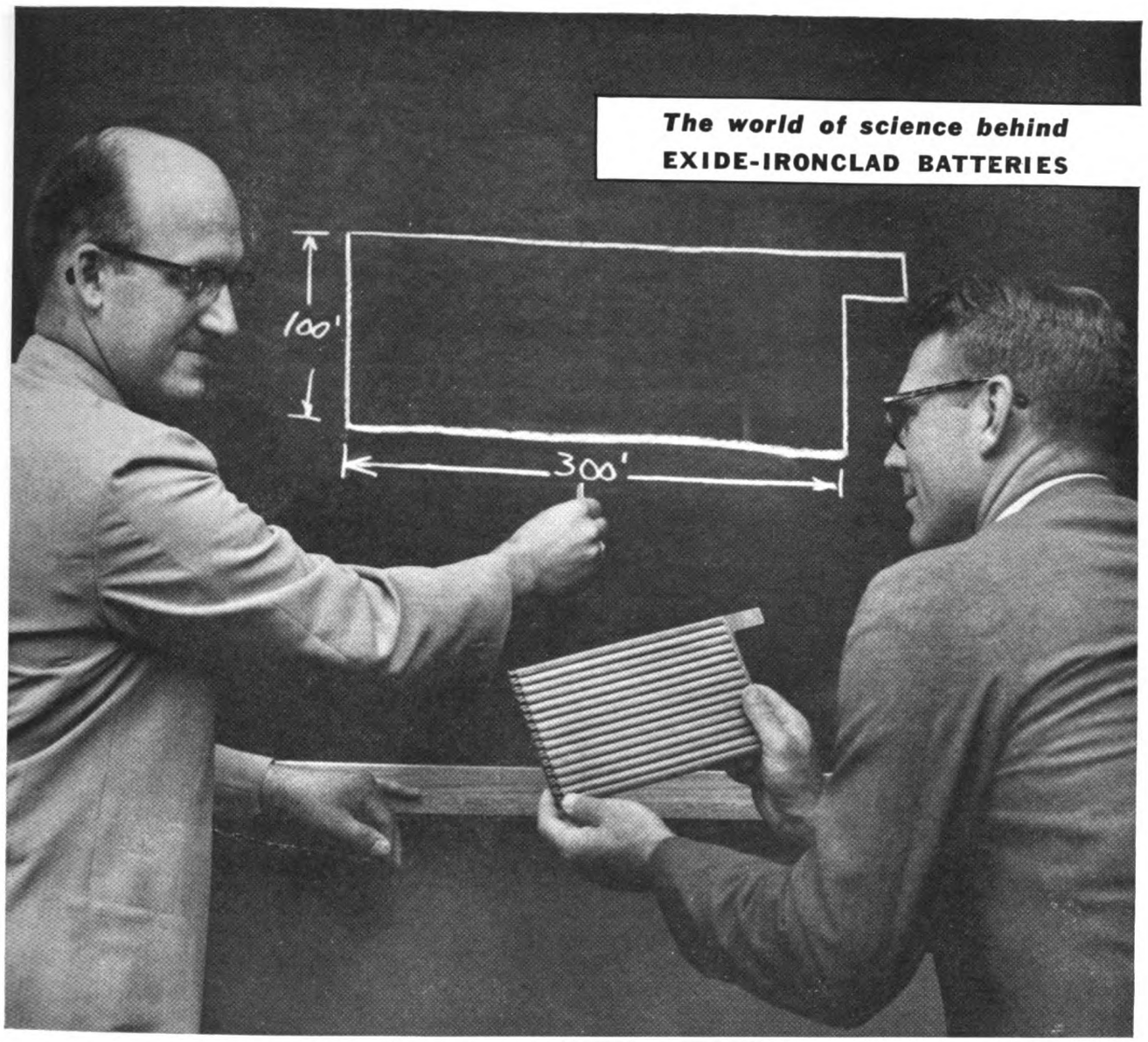


Fig. 4—Creepage surfaces on armatures and field coils.



Being interviewed is G. S. Hartman, Administrative Assistant to the Director of Research.

"The active area is 48,000 times as big as the plate"

At the Exide Laboratories—**Reporter:** Are you talking about just that one Exide-Ironclad positive plate, Mr. Hartman?

Hartman: That's right. The surface area of the active material in this plate is 48,000 times as big as the plate size.

Reporter: How is that possible?

Hartman: Because Exide can take full advantage of the superior retention characteristics of the tubular plate design by using specially prepared active material. This material means more surface area.

Reporter: What does this enormous active area mean to the battery user?

Hartman: More power. An Exide-Ironclad Battery can carry heavier work loads, intermittent and continuous, because it has the extra contact area between the active material and the electrolyte where the extra power can be developed.

Reporter: Obviously, this is an important feature of the Exide-Ironclad.

Hartman: Yes it is. But it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

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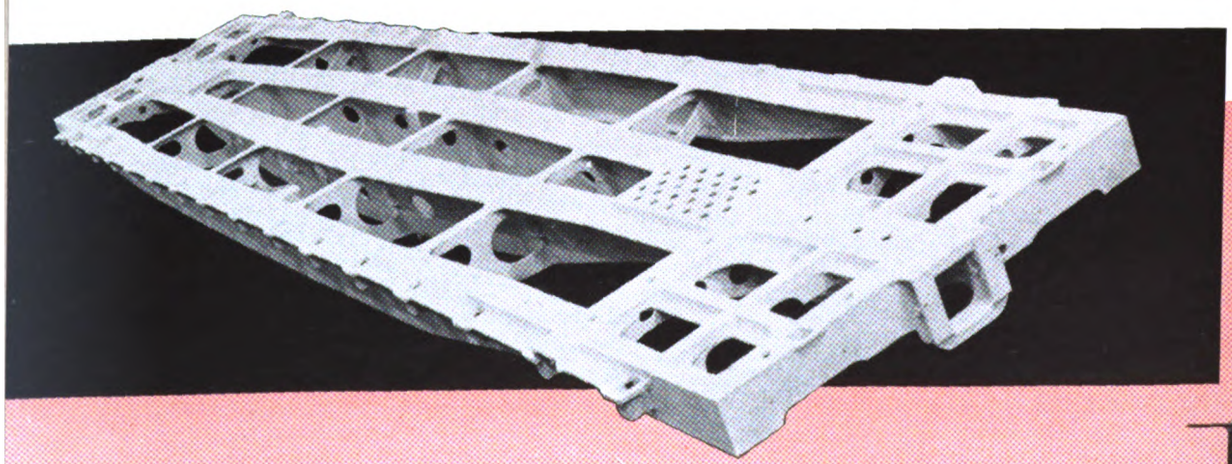
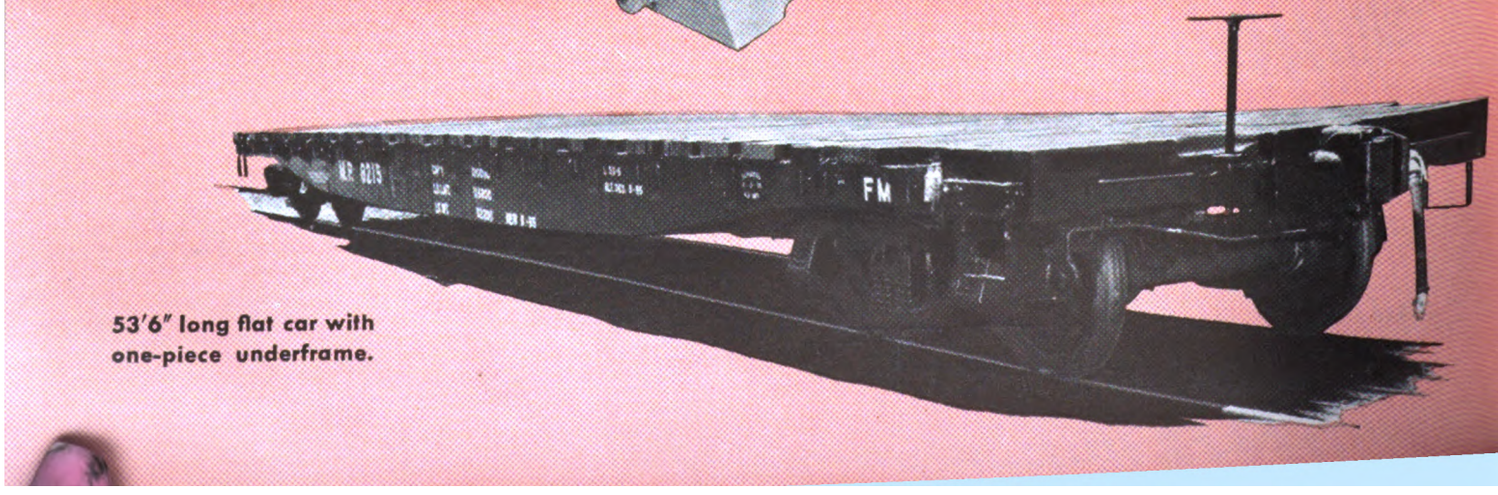
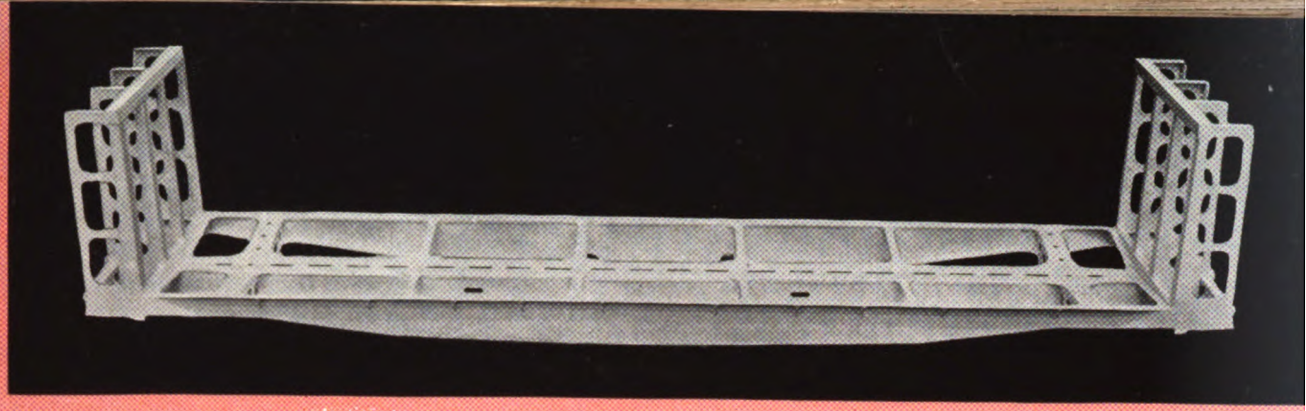


One-piece cast steel flat car underframe arranged for application of end bulkheads.



53'6" long flat car with one-piece underframe.



Commonwealth cast steel pulpwood car underframe with interlocking upright ends.

Pulpwood car with Commonwealth one-piece underframe.

maintenance-free Underframes

The Missouri Pacific Railroad has placed its *fifth* order for Commonwealth one-piece cast steel Underframes which the railroad will use to build 200 70-ton pulpwood cars. In addition, a lot of 50-ton flat cars with Commonwealth Underframes is in service.

Looking ahead to what may well be a continuation of the present period of rising costs, the Missouri Pacific is assured of years and years of maintenance-free underframe service and lower upkeep costs per car.

Many, many years of service have proven that flat cars, pulpwood cars and other types of quality freight cars with Commonwealth Underframes assure superior, better-built equipment. They provide maximum strength at minimum weight, longer life, freedom from corrosion problems and greater availability with increased revenue. Car construction is simplified.

Thousands of flat cars and pulpwood cars with Commonwealth Underframes in service on many leading railroads are proving their exceptionally long life and the sound economy of the investment.

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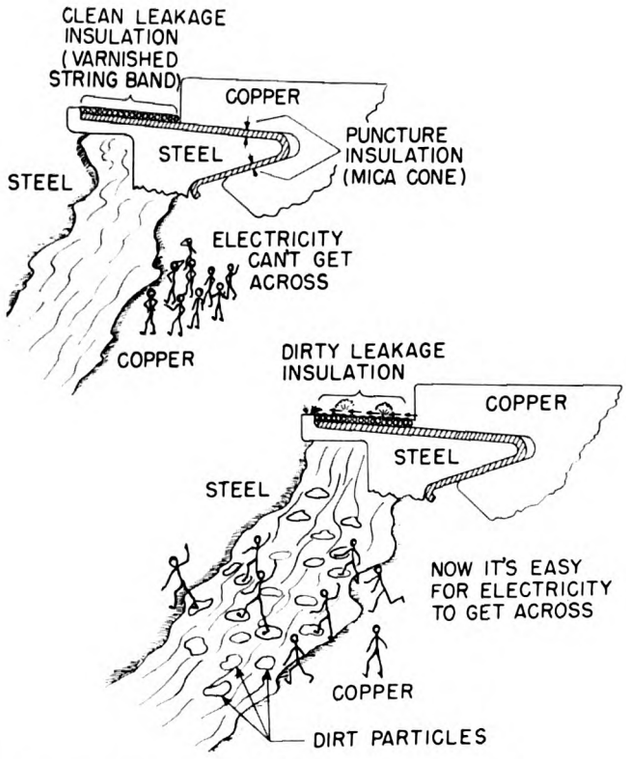

Fig. 5—How dirt on insulation lets electricity creep across.

on incoming machines have quite a bit of useful life left in them. If they are ruined, a sizable item is added to the repair bill, especially if there is a large volume of cleaning being done.

Parts exposed to operation in gear lubricants may be very hard to clean, especially if the lubricant has hardened. You may have to back up the cleaning with hand scraping or chipping to remove the hardened compound. Sometimes, in desperation, the old compound is burned off with fire. This is very bad practice. It is difficult to control the temperature, and you run a very real danger of affecting the heat treatment of important parts like pinions and gears. As a result the life of these parts can be seriously shortened. High temperature can also distort the gear case and warp it out of shape. Then there may be trouble in reassembling because of bad fits and damaged seals. Gear cases in this condition will leak excessively, endanger the gearing, mess up the trucks, and lubricate the roadbed instead of the gearing.

The higher horsepowers being transmitted through motor gearing today make the gear case an importan piece of machinery. Cleaners strong enough to remove gear lubricant will usually destroy the felt rubbing seals. In any event it is a good idea to replace the seals with new ones. And don't overlook the gaskets in the filler opening lids. When the gears are running they throw lubricant all around in the gear case. It will escape at the lid as well as at the axle bore unless the seals are on the job.

Metal surfaces not only get dirty, they also oxidize. This is the result of chemical combination of the metal with the oxygen of the air and is specially bad on parts that have been overheated. This oxide is most troublesome when it occurs on brass contacts, such as terminals or brush holders. There it causes heating because of its high resistance to the flow of electric current.

Oxide can be removed by hand sanding or abrasive blasting. Another method commonly used is acid pickling. This is an old method of removing oxide and brightening up the metal surface. All dirt and grease must first be removed from the parts. Usually this is done with a strong alkaline detergent in a hot water tank. The part is next rinsed in water and then placed in a solution of nitric acid. When it becomes bright it is removed and rinsed. A word of caution: you are dealing with acid—be careful! Good ventilation is required over the tank to remove the dangerous fumes given off. Do not dip steel brushholder springs in acid. There is danger of hydrogen embrittlement which may cause them to snap. If you suspect this has happened, try baking the springs for four hours at 200 deg C (392 deg F). Also, be sure that no insulated parts get into the acid.

Cleaning Insulation

Cleaning mechanical parts is a straightforward process. Railroads have plenty of background and experience in this kind of work. When it comes to cleaning the electrical parts of the equipment we are apt to run into differences of opinions. Most of the problems have to do with the electrical insulation of machines. Dirt is still the villain. It may clog ventilating air passages, cause brushes to stick in holders, and create a fire hazard. The real concern, however, is that it causes the electrical insulation to break down. If not caught in time, this often leads to road failures.

What is the nature of insulation and how is it affected by dirt? Insulation doesn't do any work. It is the copper conductors that carry the current which magnetizes the iron. This magnetic force in a motor moves the train. In a generator, conductors moving through the magnetic field generate voltage which moves the current. Is the insulation just going along for the ride? What does it do? The answer is illustrated in Fig. 2. Insulation wrapped around a conductor is like the wall of a pipe. It keeps the electric current from escaping from the conductor, and makes it follow the proper path so that it does the job it should. In this sense, we can't get along without insulation any more than we can get along without the wall of a pipe.

The natural conclusion is that if we wrap enough insulation around the parts all electrical troubles will be at an end. This cannot be done, however, because there is only a limited space for the iron and copper which do the work. If most of this space is filled up with insulation the machine will not develop the power it should. Another thing, good electrical insulators are

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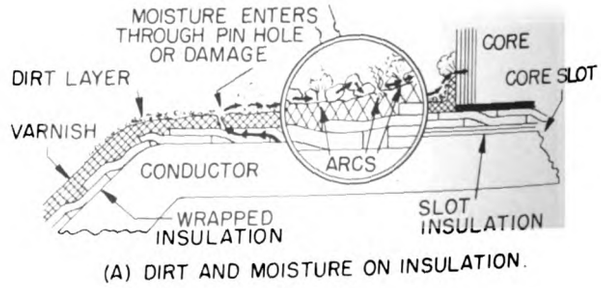

(A) DIRT AND MOISTURE ON INSULATION.

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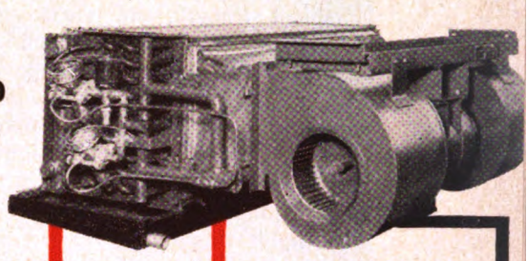

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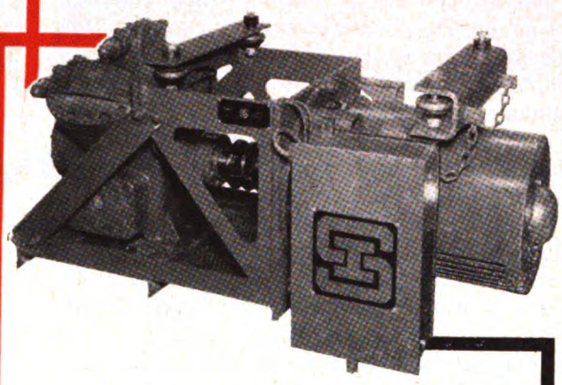

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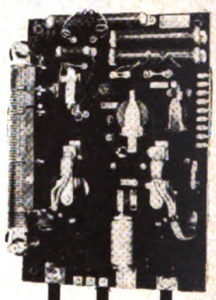

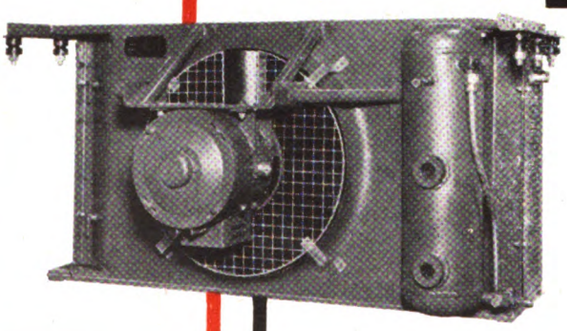

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also good heat insulators. For instance, if you hold one end of a glass rod in a flame the other end will remain cool. If you try this with a copper rod it will quickly get too hot to hold. If electric working parts are wrapped with too much insulation the heat can't get out and the parts will overheat.

Fortunately, insulators are electrically strong. Hence, a small thickness between conductors will easily insulate a machine for its operating voltage. Unfortunately, this very strength is the chief weakness of insulation. Because it is so thin it has very little mechanical strength, and is easily damaged by a blow, a scratch, or the action of chemicals. Once it has been damaged the operating voltage will burst through and cause a failure. It's very much like steam or water bursting through a rusted or damaged pipe wall. When in good condition the insulation is usually adequate to resist electrical puncture. If it is hurt by soaking or overheating, or if it is damaged by cutting or rubbing, it is liable to puncture. There isn't much that a shop man can do about the puncture strength of insulation. The designer determines this. Furthermore, such insulation is mostly inaccessible and hidden, being buried in the machine.

There is, however, another aspect of insulation that is very much the concern of the shop man and the cleaning program. This is the leakage or creepage surfaces of the insulation system. All electrical parts cannot be completely covered with insulation. The brushes and commutator, for instance, must be left exposed so that they can make moving contact with each other. The insulation around such parts is extended many many more times than the thickness required to resist puncture, as shown in Fig. 3. This is to separate the exposed electrical part from the nearest escape point by a wide surface and air space and keep electricity on the job just as if it were in a conductor wrapped with insulation.

Good examples of leakage insulation surfaces are found at the end of the commutator, Fig. 3. Here they are used to separate the steel parts from the copper segments that carry the current. The porcelain sleeve or other insulation separating the brush holder from the steel clamp holding the assembly to the frame is another example. Field coil terminals, Fig. 4, are spaced away from the poles and frame to provide the necessary leakage distance. From these examples you can get an idea of what we are talking about.

A creepage surface on insulation may be compared to a stream too wide to jump across, Fig. 5. If enough stepping stones are dropped into the stream it becomes easy to walk across without jumping. Particles of dirt on the insulation surface are like stepping stones. If enough of them collect, electricity begins to leak across and escape. At first this leakage is only a little trickle. Tiny twinkling sparks may be seen as the current moves across this layer of dirt. But don't underestimate these tiny sparks. If you could look at them through a magnifying glass they would appear vicious and hot, just like a welder's arc. These little arcs begin to burn and char the insulation. This makes a better path and allows more and more current to flow until the insulation fails completely. The entire power of the machine then breaks through the fault in a damaging blast. It's well worthwhile to clearly understand the nature of electric current leakage across insulation. The chief reason for cleaning is to remove the *stepping stones* of dirt on the creepage surface and bring the insulation back to normal.

The Nature of Dirt

Now let's see what kind of dirt it is that leads to all this trouble: The dirt found on insulation surfaces in railroad equipment is mainly in the form of dust. Often it is from 80 to 90 per cent carbon, iron, copper and sand. The carbon comes mainly from soot, smoke and carbon brushes. The iron comes from brake shoes and wheels. This iron dust is magnetic, so it is attracted by and clings to the magnitized parts of electric machinery. Copper is also found in the dirt as well as sand. All of these materials except sand are very good conductors. No wonder this dirt makes such a fine escape path for electricity when it settles on insulation surfaces.

If the dirt remained in the form of dry dust it could easily be blown off the smooth insulation surfaces. Railroads, however, operate in all kinds of weather, so the dust doesn't always stay dry. Moisture has a way of soaking into the dust and compacting it to make a better escape path. In fact, the moisture itself helps to bridge the spaces between the dirt particles and further lower the resistance to leakage currents. Also, moisture seeks out cracks and pin holes in the insulation which dry dust alone would not penetrate, as shown in Fig. 6.

Even by itself moisture can be a bad actor. When it settles on or soaks into the insulation it usually has conducting material dissolved in it. This makes it a ready conductor of electricity. Let's see what happens when current flows through a film of water on an insulating surface. The heat generated causes the moisture to evaporate from the leakage path. Finally the thin water film separates into little wet islands. The current then appears as twinkling sparks between these wet spots. As the space between the wet areas gets

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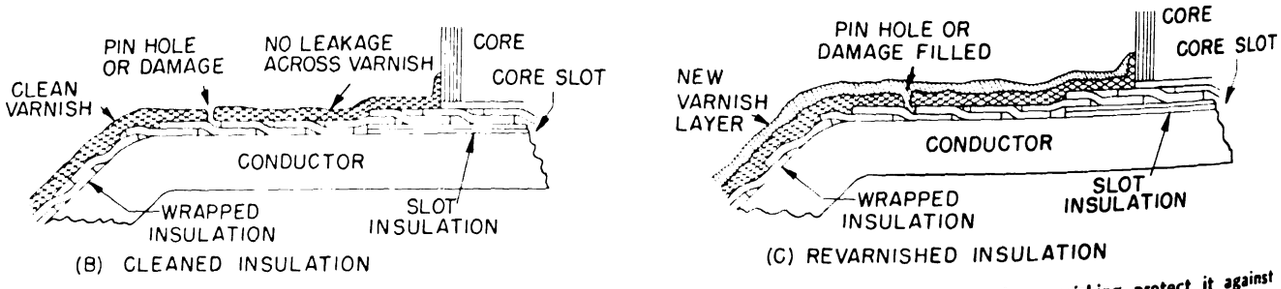
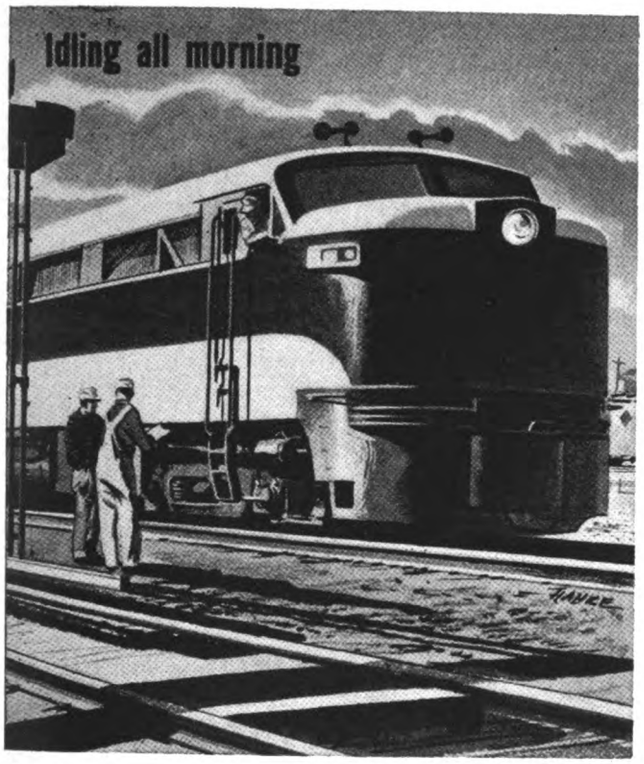
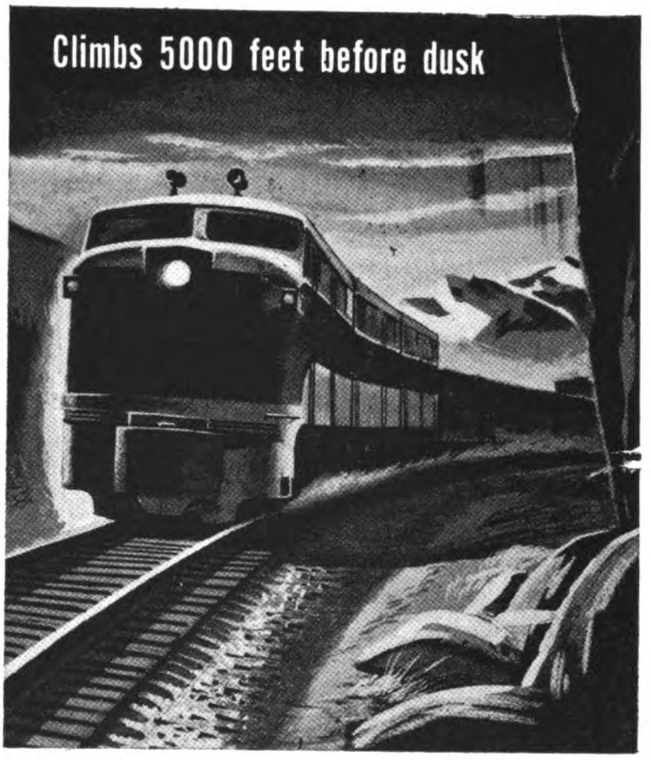


Fig. 6—(6A appears on page 62, 6B and 6C above)—Moisture helps insulation break down, but cleaning and revarnishing protect it against such failure.

This job isn't as tough as it looks...





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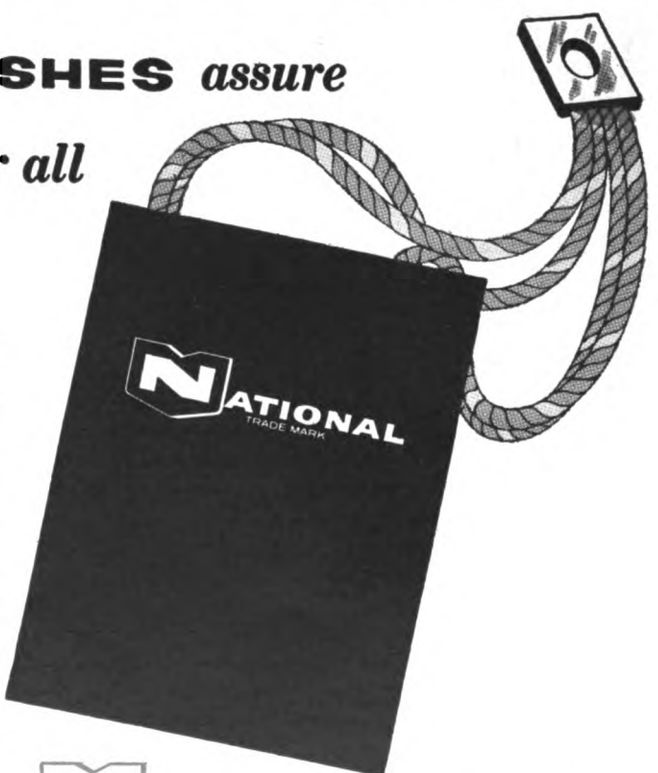
Long brush life, excellent commutator condition — "National" brushes assure both on all types of equipment, in all classes of service. Reason for such remarkably *balanced performance:* NATIONAL CARBON'S long-term brush development *specifically for railroads.*

Millions of test-miles prove out each "National" brush grade. And there's a fully tested brush for every diesel-electric traction motor and generator requirement. Ask your "National" brush man to show you why his brushes outsell all others combined.



BALANCED PERFORMANCE ASSURES:

LONG BRUSH LIFE — stands up under constant shock and long, hard runs.

EXCELLENT COMMUTATOR CONDITION — superior film-forming qualities preserve commutators and assure smooth, quiet running.

NATIONAL BRUSHES
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Best for all types of equipment . . . preferred for all types of service

UNION CARBIDE

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larger these electric arcs are drawn out and begin to char and burn the insulation. Now it's a race between how fast the water dries up and how fast the current burns into the insulation. You're lucky if the water dries up before permanent damage is done. If a track is burned across the insulation where it can't be reached, that part of the machine may have to be rebuilt. This explains why electricity should never be applied to a wet machine. It's a good point to keep in mind when handling machines that have come through rain without adequate protection in shipment or that have been removed from water after a wreck. It is also something to watch out for if the machine has been stored in a damp place for a long time.

Other Enemies

Dust and water are not the only enemies of insulation. Oil is another trouble maker, especially on diesel-electric locomotives. The diesel engine and other mechanical equipment have a habit of spreading oil and oil vapor to everything in the vicitnity, including electric equipment. Perhaps it seems strange to think of oil as being bad for insulation because, by itself, it is a very good insulator. However, it has one serious fault: it collects dirt and holds onto it. That's why it is used in air filters as a dirt-catcher. In the same way, an oily deposit on the insulation surface collects dirt and causes it to stick. There it forms a thick muck that resists every attempt to blow it away. Washing is the only way this oily muck can be removed.

Not only does oil make dirt stick to the surface of insulation, it also creeps in between the layers of insulation, Fig. 6, and carries the dirt with it. This action is something like that of moisture. In addition, when some oils are exposed to air they break down chemically and develop an acid reaction. This, of course, is bad for insulation.

There is still another kind of dirt which resists removal by either blowing or washing. It is a very thin conducting film stuck tightly to the insulation surface, something like a smoky coat of grime. Squirting washing solutions on it makes it look shiny and you may think it is gone. But as soon as the machine dries there it is, as dull as ever. This kind of dirt just doesn't wash off, it must be removed mechanically by a scrubbing action. The best method is to use an abrasive blast in powder or pellet form.

Cleaning Methods

Having seen the nature of the different kinds of dirt and how they act we know what we are up against. This is helpful in understanding what to expect from the different cleaning methods. Now let's look at several of these.

The simplest method of cleaning is to blow the dust and dirt off the insulation surface with compressed air. This is only effective when the dirt and dust are dry and readily moved by the air. Blow with a purpose; know what you are doing when you are doing it. Direct the jet of air where it will do good. Watch to see that you are getting the results you expect. Also, take into account where the cloud of dust is going to settle. There is no point in letting it spread all over the shop. There should be some means of removing the dust from the cleaning area. A hooded enclosure with at least three walls, ventilated by an exhaust fan is good. This constantly moves clean air into the work area and removes the dust-filled air.

Washing is another method of removing dirt from insulation, especially when it cannot be blown off. The simplest form of washing is done with a bucket of cleaning solution and a rag or brush to apply it, Fig. 7. This is an old standby and still has its place where only a small amount of equipment has to be cleaned. Although this method may seem very simple there are some fine points to it. The selection of the proper cleaning solution is one. While water with various detergents can be used, the general favorite is a petroleum or chlorinated grease solvent. Strong caustic solutions, if used, can be pretty rough on the skin, so the hands should be protected with suitable rubber gloves. Petroleum solvents are usually explosive and present a fire hazard. Insurance companies are emphatic about precautions that must be taken when choosing such a solvent. On the other hand, the fumes of chlorinated-type solvents are poisonous in varying degrees. They can even soak through the skin and get into the body. Furthermore, all these solvents can degrease you. Proper protection against these hazards must be provided.

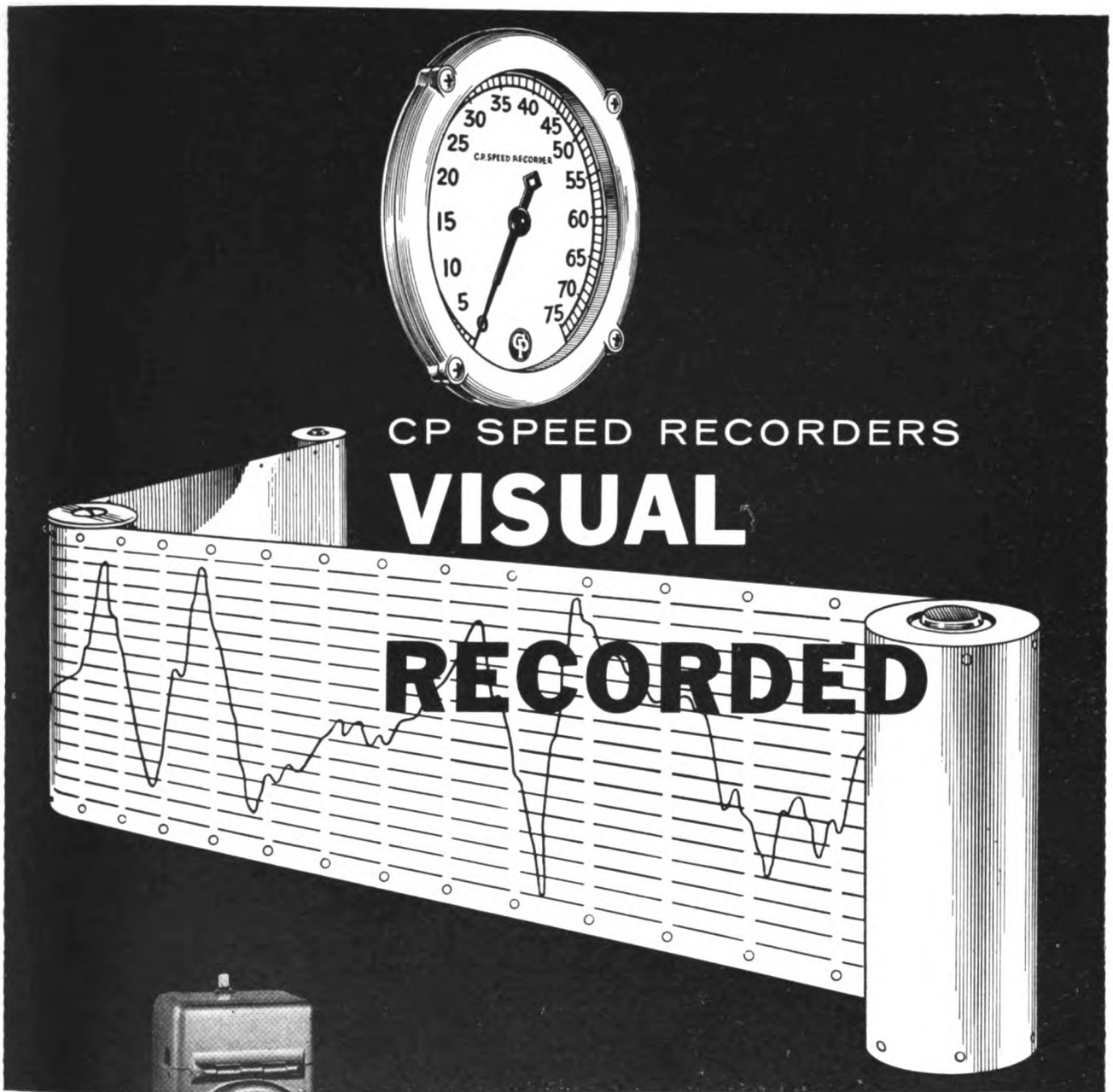
Adequate ventilation is an absolute necessity when using these solvents. The explosive or toxic hazard they create is usually measured by the number of parts per million (ppm) concentration in air. The object is to mix such a large volume of air with the solvent fumes that they become relatively harmless. There are different safety levels for explosion danger and poison hazard. These must be considered separately and the operation made safe on both counts. For instance, a ppm that might be safe from explosion could still be too toxic to work in, or vice versa. Check these matters with your safety department.

The so-called safety solvents are usually a mixture of petroleum and chlorinated solvents, combined in an attempt to blend the good features of both. Some of the less volatile solvents, while safer to use, tend to leave an oily film on the surface cleaned. This may be desirable for some mechanical parts, but is definitely out of place on electrical insulation.

There are many solvents and cleaners on the market, but the perfect one has not yet appeared. This ideal solvent should evaporate rapidly without leaving a residue. It should not harm electrical insulation, neither should it burn, explode nor be poisonous. A number of good solvents are in use, but each has its drawbacks. Carbon tetrachloride, for instance, is an excellent cleaner that was popular some years ago. As its use for cleaning electric machinery increased, however, more and more deaths were attributed to it. Today, many states have passed laws prohibiting its use for this purpose. It is a cumulative type of poison, that is, each bit entering the body stays until they add up to a fatal dose. Like fire and electricity, "carbontet" can be and is a useful servant; but, like them also, it can be dangerous when used without proper precautions.

There is one more thing to look into—the storage of solvents and cleaners. Suitable space and racks

(*Continued on page 68*)



CP Speed Recorders accurately indicate train running speed . . . keep clear, permanent tape records for evaluation of Operating Officials. Running time, acceleration, distance traveled, deceleration, slipping and sliding of wheels, and accumulated backward and forward movement are all recorded.

Two High Speed Recorder types are available for speeds ranging from 0 to 75 MPH and 10 to 120 MPH. Other models include Low Speed Recorders (0 to 15 MPH) that are ideally suited to the lower speeds required for humping cars and a 0 to 35 MPH unit for slightly higher speeds of the terminal area. Dual-control locomotives can be furnished with an auxiliary CP Remote Speed Indicator.

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SPEED RECORDERS AND INDICATORS • PNEUMATIC AND ELECTRIC TOOLS
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with means for handling heavy drums and acid carboys must be worked out. It is important to arrange for a cool location. Remember, sunlight can put a lot of heat into a drum. If highly volatile solvents are stored in a hot place, pressure will be built up in the containers. Some solvents are best stored in underground tanks. Check your local safety and insurance regulations.

Beware of using aluminum containers for caustic and chlorinated solvents. Solutions of this kind have a nasty way of eating through aluminum, generating heat and dangerous gases in the process. Keep solvents in the steel drums made for them. Also, be careful not to let moisture get into chlorinated solvents. It forms an acid in the solvent. This speeds up the corrosive action on the drums and also on the parts washed with the solvent.

Individual experience and preference, as well as local industrial codes, fire and safety regulations all play a part in the selection of the cleaning agent and method. Visits to other shops are also helpful. As we all know, feelings play a large part in determining our choices. You might win if you play a hunch on the ponies; but be sure to get the facts before you bet on a cleaning method. Study the costs, production time, capacity and kind of a job done. Above all, remember that cleaning is not done for the sake of cleaning. It is one of the shop's most important jobs.

While parts may fatigue, fail and get wrecked, dirt is more like a disease that creeps up and causes good insulation to fail. For instance, during the Civil War more soldiers were killed by disease than by bullets. The chances of a wounded man surviving hospitalization were pretty slim. Why? Because of unsanitary conditions and inadequate treatment. If a railroad shop is run like a Civil War hospital the mortality rate on electric apparatus is bound to be high. Proper shop equipment and methods, clean surroundings, and a thorough workman like job will help keep your locomotives healthy and out on the firing line where they belong.

From the Diesel Maintainer's Note Book

Just for the Ride

DIESEL ENEMY NO. 2 (our old friend *Carelessness*) got loose a few days ago and caused a failure that should never have happened.

A two-unit Alco diesel was dispatched from the terminal, apparently in good working order. A short distance out on the line, the engineer noticed that the train seemed to slow down more than usual when going up grade. The train was a comparatively light one, and the grade was not severe. He did not note anything that would explain the lack of power, so he continued on the trip until he reached a point where he needed the full power of his two units, and had to stop.

There was an embarrassing delay which resulted in a second delay to a passenger train. The passenger crew went over to the freight diesel to offer assistance. In a very few minutes, they found there was no control air on the lead unit. They also found that the control air supply valve was shut off and that the drain valve was shut off, and that the drain valve on the control air reservoir was open.

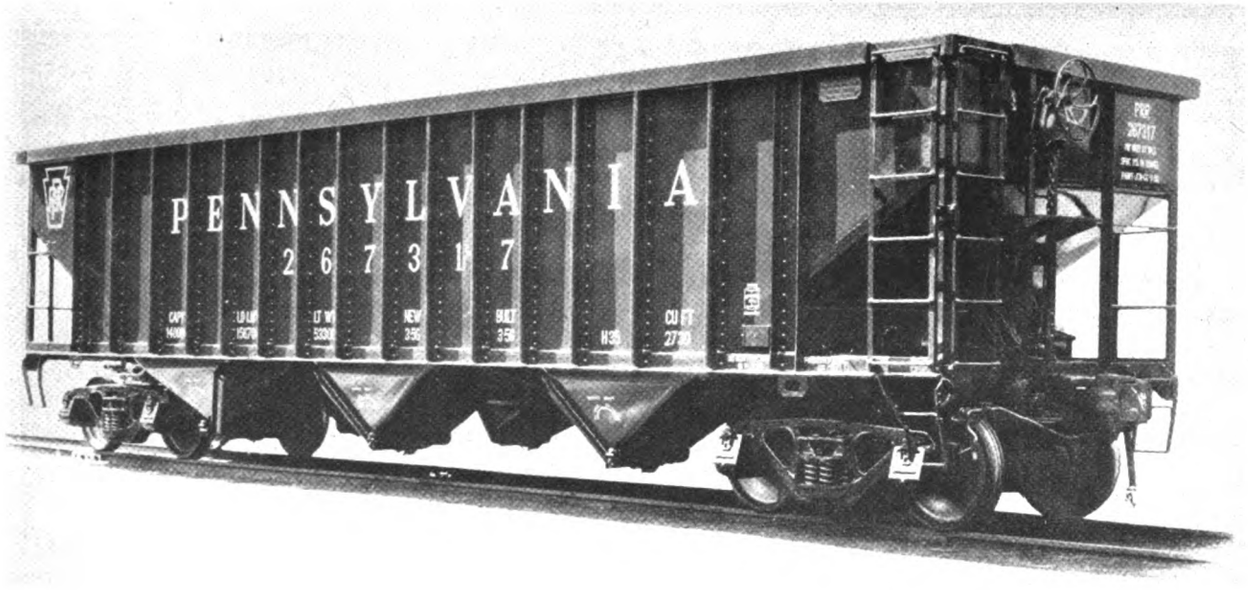
These valves (located in the nose compartment) were reset in the proper position and the trouble was corrected. This is another case where carelessness was displayed by both the maintenance force and the engine crew. The maintainers and the inspector should have known that control air was available before the unit was dispatched.

They were apparently fooled by the fact that the engine would "rev" up in response to the throttle, but had not checked to see that the various control contactors were operating so that the engine could deliver power.

The engineer had an excellent opportunity to detect the trouble if he had just looked at the load ammeter, which is on the panel in front of him. The load meter was not showing any loading whatever when the locomotive left the yard. In other words, the lead unit was just a loafer that was going along for the ride.

The unit that was improperly set up for operation—having arrived at its dispatching point being towed dead in the train in a move to transfer power. It had been set up for towing dead. Then it had been called for service, and the unit was not given a thorough control and power test to determine that it was okay for road service.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



"Pennsy" standardizes on high strength low alloy steels containing nickel for ALL new hopper cars

Pennsylvania Railroad recently received delivery of a fleet of new 70-ton hopper cars.

The high tensile steel plates which contact the lading are expected to last approximately 50% longer than the carbon steel sheets formerly used in hopper cars of this type.

To provide this increased life expectancy, the "Pennsy" is standardizing for all new open-top hopper cars, on the use of high strength low alloy steels containing nickel, for all body sheets which contact the lading.

This policy provides extra strength, wear- and corrosion-resistance without adding to weight. As far as maintenance costs are concerned, the use of high strength low alloy steels permits the "Pennsy" to cut heavy repair work and "out-of-service" time in half.

High strength low alloy steels are ideal for railroad freight car bodies

They provide:

(1) Yield strength of 50,000 psi minimum in the as-rolled condition, which permits either:

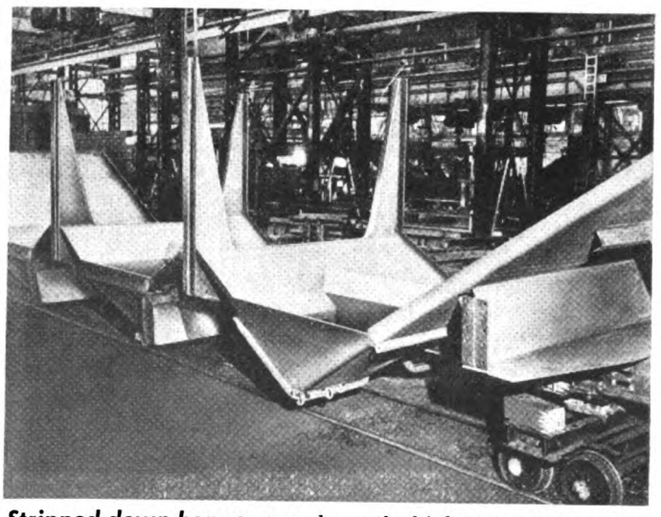
(a) appreciable weight reduction by using thinner sections . . . or

(b) if the same sections are used as for carbon steel, much better durability and minimum maintenance.

(2) Excellent response to usual fabrication operations . . . easy forming . . . easy welding.

(3) Good resistance to corrosion, abrasion and impact.

Send for "Nickel-Copper High Strength Low Alloy Steels." A copy is yours for the asking.



Stripped down hopper car shows the high strength low alloy nickel-containing steel sheets used in fabricating the PRR's new triple-hopper type cars. The use of high strength low alloy steels is expected to lengthen car life, reduce maintenance costs and provide greater equipment availability.

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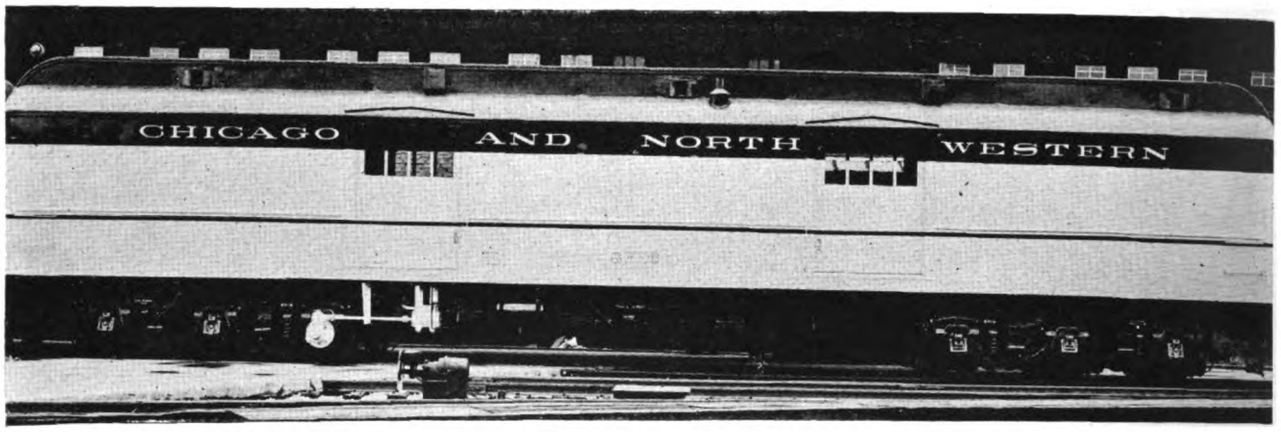


The drive and generator appear very small with relation to the size of the car.

Baggage Car Lighting Simplified

C & NW adopts system which employs outboard gear drive of self-excited inductor alternator

By L. E. Legg
Electrical Engineer
Chicago & North Western System

SOMETHING NEW in electric lighting of head-end cars is being tested by the Chicago and North Western. Baggage car No. 8616 is equipped with a 12-volt type A6H nickel-iron-alkaline battery of 255 amp-hr capacity. Charging is accomplished with a Safety Industries 1.5-kw, 15-volt, 2-phase inductor alternator through two bridge type power rectifiers. The alternator is capable of continuously delivering a rectified output of 108 amp at 14 volts. It has no slip rings, brushes, commutators, polarity changer, moving contacts or rotating windings. The machine is self-excited; therefore, it does not depend on battery energy for excitation.

Both output and field coils are encapsulated in epoxy resin, which makes the alternator entirely moistureproof and free from foreign matter.

The bearings are of the shielded type, requiring no lubrication between overhauls, which it is estimated will be a period of five years.

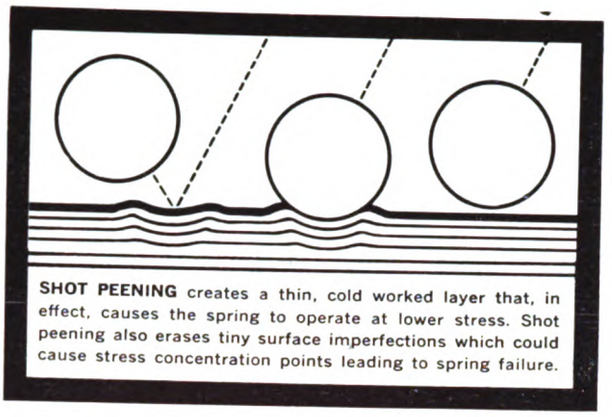
The moving element consists of two permanent magnet laminated rotors rigidly attached to the shaft which have a number of teeth equal to the frequency of the alternating voltage in cycles per revolution, and to half the number of poles in an equivalent synchronous generator. In this type of inductor alternator, the generation of voltage depends on a variation in air gap or magnetic reluctance to cause a flux linkage change in the armature coils, which, as stated before, are stationary. Tests have indicated higher efficiencies than equivalent synchronous generators of the same size. Even though this type of alternator has operated successfully at 20,000 rpm in other applications, it revolves at only 5,000 rpm at 100 mph in this operation. The cut-in speed is 700 rpm, and the rated speed is 7,000 rpm. Therefore, this railroad application is well within the rated speed limitations of the machine.

The alternator is driven by a Spicer positive gear drive, the power being transmitted from the end of axle through a coupling shaft to the gear unit, and thence, horizontally via a propeller shaft. The ratio is 5.28 to 1. This type of drive is fully enclosed; therefore, it is not affected by flying ballast, dirt, snow, rain or temperature. It is expected that maintenance will be at a minimum, inasmuch as the parts are light weight with spiral gears running on anti-friction bearings in a bath of light oil.

The inductor-alternator is cradle-mounted underneath the car, while the battery, rectifiers, voltage regulator and other electrical apparatus are mounted within a metal cabinet, located at one end inside the car. Inasmuch as nickel-iron-alkaline batteries give off nothing but hydrogen, they may be located in close proximity of control apparatus without fear of corrosion; and likewise, there is no objectionable odor or effect to the riders of the car.

The rectifiers have thermisters which limit the power output of the system, and which are also encapsulated in epoxy resin. This system will permit harmless short time high charging rates, but it will not tolerate harmful overloads. The protective

made stronger to last longer



SHOT PEENING creates a thin, cold worked layer that, in effect, causes the spring to operate at lower stress. Shot peening also erases tiny surface imperfections which could cause stress concentration points leading to spring failure.

Crucible *fatigue-resistant* springs

cut bad-order car expense

You can help keep cars off the repair tracks with Crucible's *fatigue-resistant* springs. They're single heat treated and shot peened – *made stronger to last longer* – yet they cost no more than conventional springs.

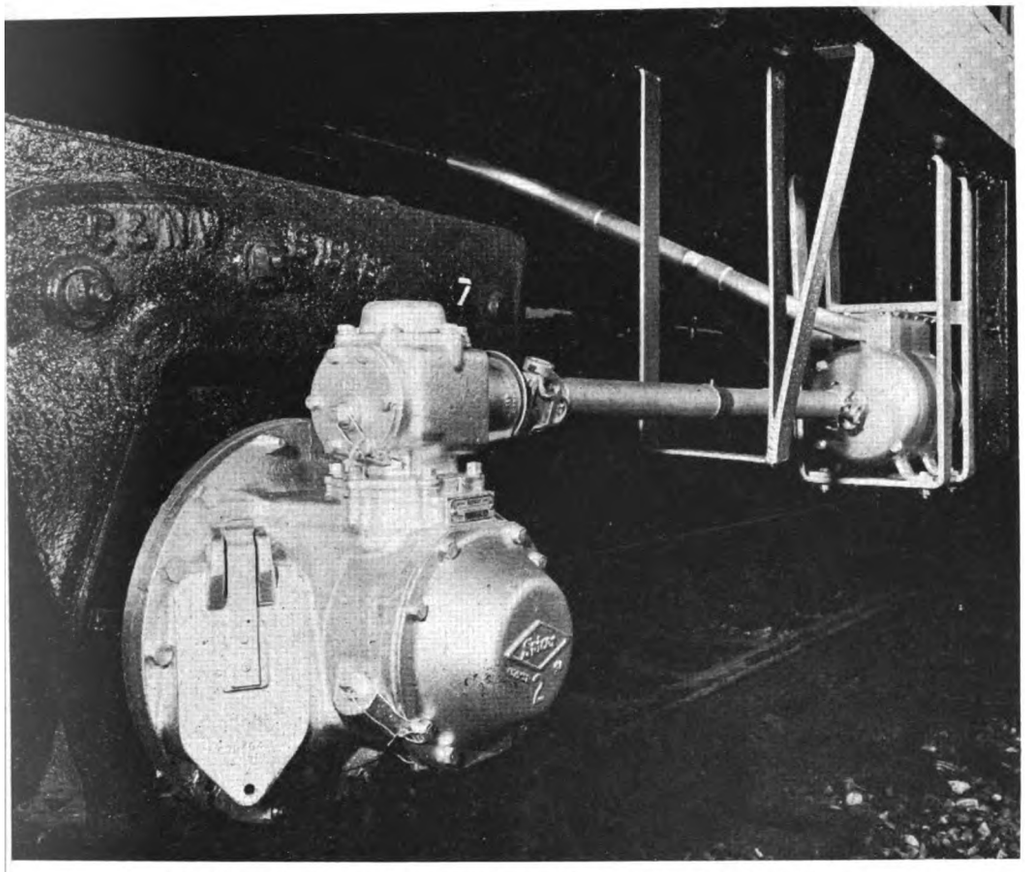
Because they last longer, Crucible *fatigue-resistant* springs reduce replacements due to spring failures–90% of which are caused by permanent set.

Fatigue-resistant springs can maintain their load-carrying capacities over longer periods because they have better hardenability, higher elastic limits and greater resistance to working stresses. Crucible ensures these qualities in every spring through strict manufacturing control from ore through final, rigorous compression tests.

Crucible single heat treated *fatigue-resistant* springs are your best guarantee of low-cost, long-lasting spring performance. For details, write for folder: *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

CRUCIBLE spring division

Crucible Steel Company of America



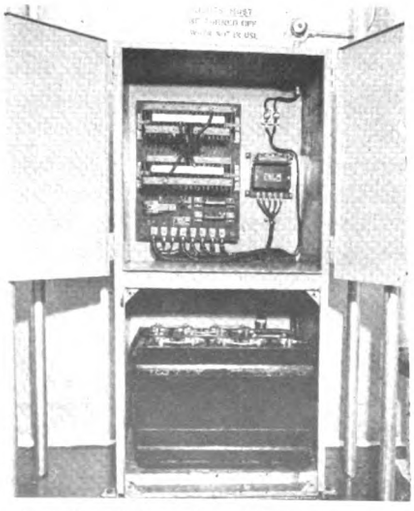
The drive and generator have capacities greatly in excess of load requirements.

system functions on temperature of the rectifiers, rather than current control. This feature is in contrast to presently used systems which will not permit any overload whatsoever. It is not objectionable to recharge the battery at a high rate, after long stops.

Through the use of a second small rectifier and relay, all battery parasitic discharge is eliminated wnen the car is at standstill. No lamp regulator is used, as the voltage regulation is plus or minus 2 per cent over the entire speed range.

It is intended that this car will be entirely self-sustaining. There are no charging receptacles on the car and, of course, it cannot be trainlined.

Inasmuch as great abuse is frequently given batteries, due to careless standby charging, the optimum in battery life is expected from this new application.



A steel cabinet in the car houses the rectifier, control equipment and storage battery.

Eight 25-watt lamps down the centerline of the ceiling, supply general lighting.

Two principal reasons dictated the choice of the nickel-iron-alkaline battery for this baggage car application: (1) it will not freeze when discharged, and (2) the ability to accept extremely high rate of charge when in this state. Baggage cars occasionally stand for long periods at a time, and the lights are sometimes left on.

The lighting wiring is No. 10, and there are eight 25-watt lamps down the center line of the ceiling, and one 25-watt lamp over the desk, which provide ample illumination for working.

It is anticipated, that only one man-hour per month will be required for maintenance which should permit flushing of the battery, lubrication of the Spicer properler and coupling shafts, checking oil level in the gear box and blowing out the electrical cabinet. The initial test run was made on July 8 and 9, between Chicago and Duluth, Minn. Aside from the usual minor adjustments being required, the car has operated perfectly to date. Those who conducted the tests were Roy A. Slettevold, of Safety Industries, B. L. Mackey, of Thomas A. Edison Industries, Peter Sterniola, of the Dana Corporation, F. C. Ohlander, of DuBois Engineering Corporation, and the writer.

The above mentioned companies were the suppliers of the apparatus undergoing field tests.

Actual discharge tests reveal that the car has 20 hours of standby energy with all lights burning continuously and the car standing.

The cost of the installation was about one-third that of equipment used in the past, and the gross weight has been reduced by approximately 60 per cent. It has been estimated, that the cost of handling excess weight on railroads amounts to two mils per ton mile, which, if true, should justify an increase in capital investment of as much as $2.00 for each pound of weight saved.

C. J. Fitzpatrick, president, C & NW, announced that electric lighting of those baggage cars not already electrified is one of the steps being taken for improving the railroad's passenger train equipment and service.

General Electric Locomotive Cables

wherever overloads are a problem

Steep grades and heavy hauls often mean overloads on locomotive cables. In conditions such as these, insulation to withstand the resultant high copper temperatures without deteriorating is required. That's one of the outstanding advantages you get by rewiring with General Electric Versatol* Geoprene* locomotive cable.

Another is this cable's ability to stand up under other severe operating conditions. The tough, neoprene-base jacket will withstand flying pebbles, abrasion, vibration, flexing, and attack from such corrosive agents as oils, steam, detergents, and other cleaning compounds.

You get immediate delivery service, too, because Versatol Geoprene is stocked in a variety of types for all applications (even extreme temperature) right in conveniently located warehouses. For more information, write Section W214-947,, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

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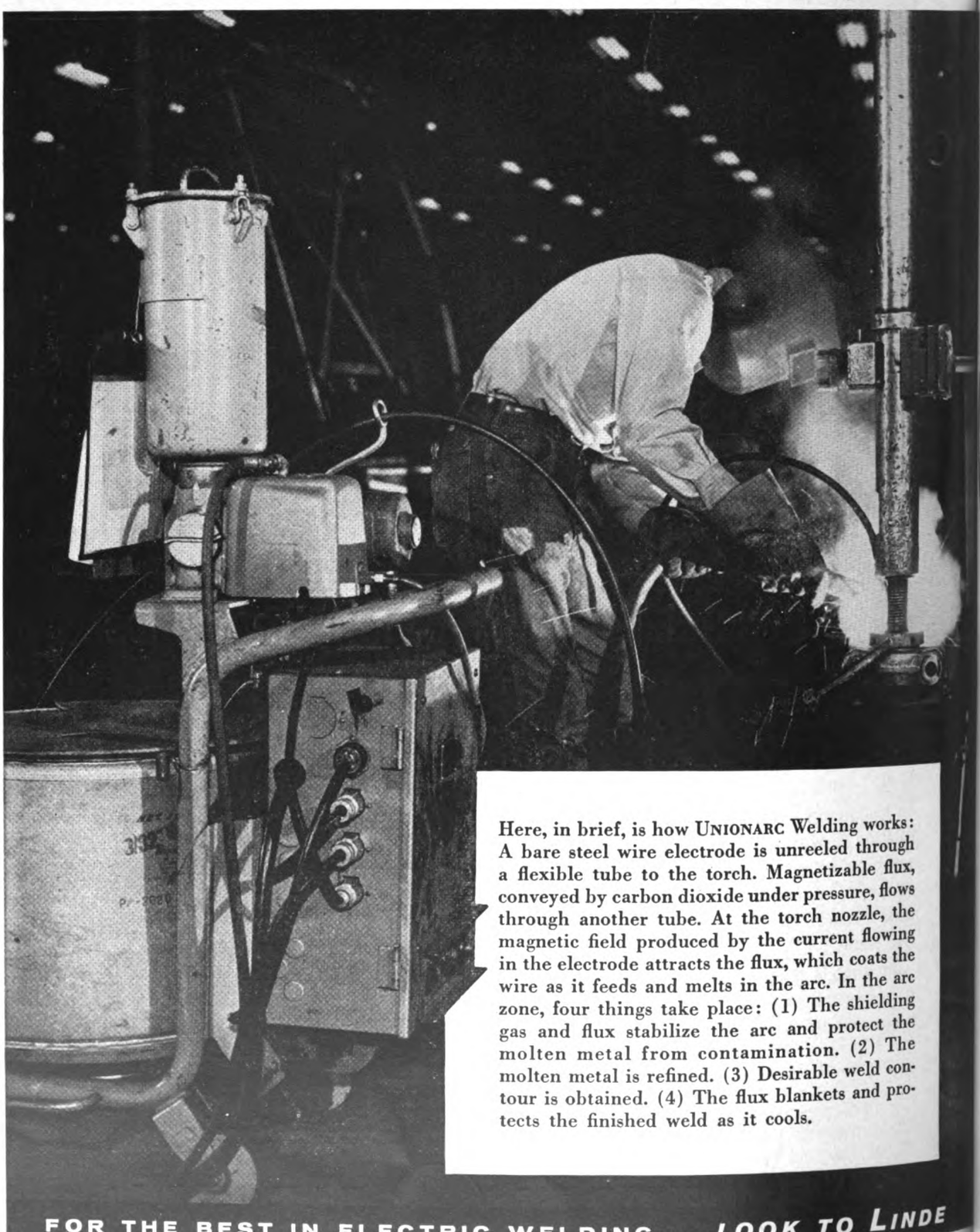
Progress Is Our Most Important Product

GENERAL ELECTRIC

Now... LINDE offers you another UNIONARC Magnetic



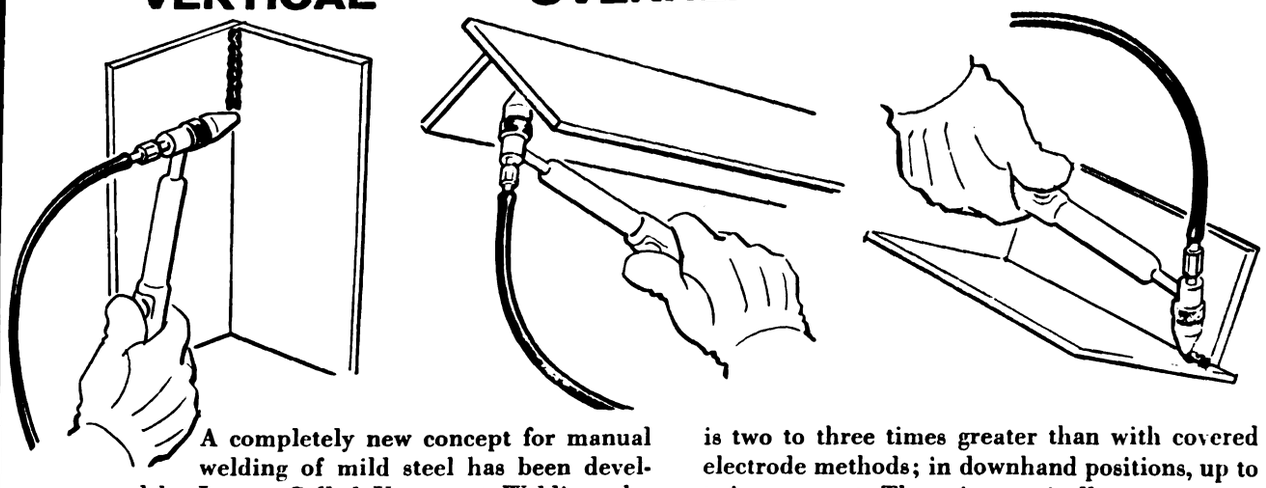
Here, in brief, is how UNIONARC Welding works: A bare steel wire electrode is unreeled through a flexible tube to the torch. Magnetizable flux, conveyed by carbon dioxide under pressure, flows through another tube. At the torch nozzle, the magnetic field produced by the current flowing in the electrode attracts the flux, which coats the wire as it feeds and melts in the arc. In the arc zone, four things take place: (1) The shielding gas and flux stabilize the arc and protect the molten metal from contamination. (2) The molten metal is refined. (3) Desirable weld contour is obtained. (4) The flux blankets and protects the finished weld as it cools.

FOR THE BEST IN ELECTRIC WELDING . . . *LOOK TO LINDE*

th modern welding method—
net Flux Gas Shielded Arc Welding

UNIONARC *is an entirely new method of welding steel in all manual positions...*

VERTICAL **OVERHEAD** **DOWNHAND**



A completely new concept for manual welding of mild steel has been developed by LINDE. Called UNIONARC Welding, the method uses a continuously-fed bare steel wire electrode, which is magnetically coated with flux and shielded by carbon dioxide. The torch can be easily handled in all welding positions—vertical, overhead, downhand. Manual welds can be made at higher speeds and at lower cost than with covered electrodes. UNIONARC Welding produces high-quality welds in steel, even when moderate amounts of rust, scale, and moisture are present.

Among the numerous advantages of UNIONARC Welding are these: Rate of operation is up to three times faster than with covered electrodes. There is no stopping to renew electrodes, since a single loading of wire can be fed smoothly and continuously for periods up to a week. Manual skill needed is no more than that required with covered electrodes. In vertical and overhead positions, the deposition rate in UNIONARC Welding is two to three times greater than with covered electrode methods; in downhand positions, up to twice as great. There is practically no spatter—the little that appears is easily brushed away, leaving a clean, smooth weld.

LINDE has made many notable contributions to welding. Among these are the introduction and development of submerged arc welding (UNIONMELT Welding), non-consumable electrode, inert gas shielded arc welding (HELIARC Welding), and the development of Sigma (shielded inert gas metal arc) welding. LINDE's newest method, UNIONARC Welding, is another *first*—a truly important contribution. Its simplicity and versatility make it unique. Its efficiency and economy have been proved in actual production work. Write *now* for details about new UNIONARC Welding, or better still, get complete information at Booth No. 280, Allied Railway Supply Association exhibit, September 15-18.

RAILROAD DEPARTMENT
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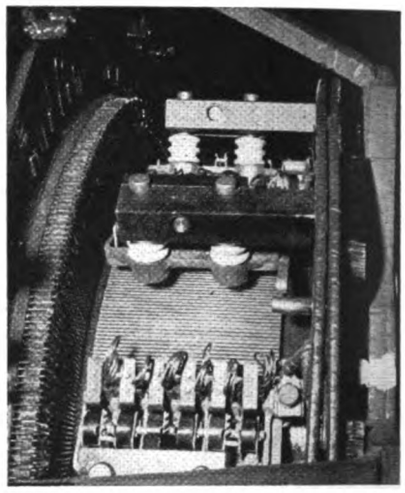
30 East 42nd Street, New York 17, New York

How Much Do You Know About Brushes



What Can Be Done About Copper Dragging and Threading?

TO THOSE OF YOU who have never seen copper dragging or threadings, it appears as a shredding-out of the trailing edges of the bars and in various stages progresses from what appears as a wire-edge to a stage where the copper has been worked until it extends almost completely across the slot to the next bar. Whenever contact is made with the next bar, the copper burns out much as a fuse would melt and usually results in a pock-mark on the edges of the two bars at that point. All pock-marks are not necessarily caused by copper dragging. They can be the result of flashovers.

There have been several theories proposed for this effect. This much is certain. Copper cannot be worked in this manner without mechanical force. Assuming the generator to be in first class condition, the only force that can cause brushes to chatter and bounce is high friction. It follows then that high friction brushes may be pounding the bars to cause this cold working of the metal. We know that brush friction increases as a result of loss of the film laid down in commutation. We know that this condition has appeared in cases where a generator has idled for many hours at no load.

On the opposite side of the picture, it must be recognized that operation of brushes at very high current density for a prolonged period can also puncture and destroy or burn off the film. We then arrive at the same high friction brush chatter condition which appears to be the cause or at least one of the principal causes of copper dragging and threading. Copper dragging is very rarely seen on traction motor commutators. The main generator and auxiliary commutators are the principal bad actors.

Some persons have recommended the removal of brushes in the studs to increase current density in order to lay down more film. Regardless of the effect of this action, the proper solution is not in changing the electrical manufacturer's design, but lies rather in applying the proper brush grades. The loads on a generator are seldom predictable and removing brushes is asking for trouble. Some of the reasoning advanced for removal of brushes is fantastic in that it proposes brushes should be removed from only one polarity.

Another theory has been advanced which states that there is some evidence which indicates that a peculiar resonance condition exists in some cases between the main generator and the diesel engine crank shaft. At the present time, the writer is not inclined to accept this as a major factor in copper dragging. This opinion is influenced by the fact that there are many identical units which have been in operation for a long time with no trouble from copper dragging.

It may be that in a final analysis copper dragging is actually the result of the formation of a skin-like layer of annealed copper on the commutator bars caused by the high localized heat generated through pin-point sparking in normal operation over months or years of operative service. Work is being done in one location where copper dragging has been very severe to try to establish the validity of this theory by turning the commutators down a little bit further than would normally be done when copper dragging appears. If this work shows that the commutators again enjoy a long period of freedom from copper dragging, we would be inclined to recommend this treatment wherever copper dragging occurs. Certainly, it would be more to the point to remove two or three thousandths from the commutator, once every 12 or 14 months than to remove one to two thousandths every 3 or 4 months.

BY K. R. MATZ
National Carbon Company

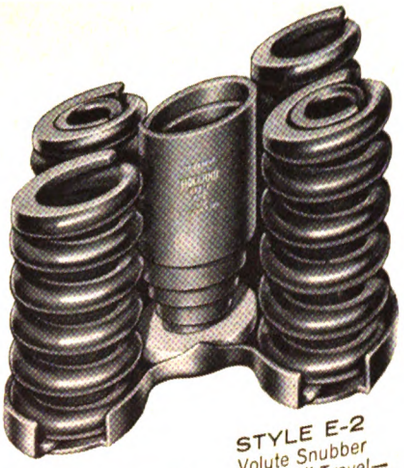
This is the sixth of a series of questions and answers which are appearing each month.

HOLLAND VOLUTE SNUBBER SPRINGS

Upgrades ride by introducing an unusually smooth snubbing action with an exceptionally high load carrying capacity. Holland's principle of utilizing the sliding action of telescoping radially compressed coils eliminates the "wedging" problem.

HOLLAND
Volute Snubber Springs, Either 1⅝" or 2½" Spring Travel

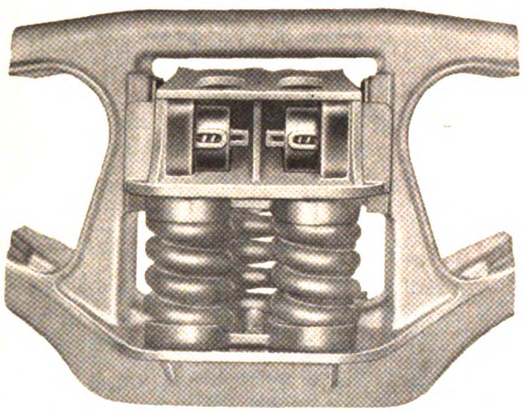
2½" 1⅝"



STYLE E-2
Volute Snubber Spring, 2½" Travel—in 50-Ton Group

HOLLAND

for the finest in Freight Car Truck Controls



Modern high speed freight service is continuously increasing the importance of Holland's pioneering efforts and engineering accomplishments in the field of ride control. Whether for the **upgrading of existing trucks** . . . or for new trucks embodying the finest in proven control principles . . . Holland has answers that will increase safety and reduce to a minimum costly damage to equipment, lading and track. For complete information, write for Holland Bulletins, Holland Company, 332 South Michigan Ave., Chicago 4, Illinois.

HOLLAND BOLSTER CONTROL UNIT STYLE RS-2

An advance over all existing devices for upgrading freight car trucks to provide new truck riding qualities at a saving over new truck cost of 80%! A significant advance over the spring "package" method; utilizes the Holland principle of direct action, axially loaded members.

You're Invited!

Please Come in and See Us at Booth Numbers 112 · 113 · 142 · 143

ALLIED RAILWAY SUPPLY ASSN. CONVENTION & EXHIBIT
Hotel Sherman, Chicago, Sept. 15-18

HOLLAND RIDE EASE TRUCK STYLE RE-2

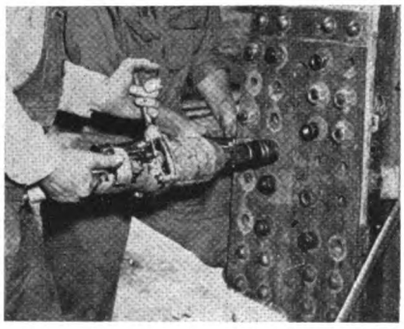
Introduces a new, yet thoroughly proven built-in bolster spring control following the same basic principle of direct acting, axially loaded friction members so successfully employed in the Holland Ride Stabilizer unit RS-1 for finest 3 way control . . . viz.: vertical, lateral and longitudinal.

EQUIPMENT

(*Continued from page 8*)

block bombarding and its controlled floating of the friction block permits full face bearing for tilt and out-of-square relationship between side frame and bolster to assure bolster control under all running conditions.

Other truck design features include long-life, hardened friction blocks; large diameter, low-stressed control springs; and hardened steel wear plates. Appreciably increased bolster end strength results from properly spaced and located vertical walls joining full top and full bottom members which, combined, from the housing for the friction blocks and control springs. The central retainer provides for retracting and retaining the friction block in the retracted position for truck assembling and dismantling operations. *Holland Company, Dept. RLC, 332 South Michigan ave., Chicago 4.*



Impact Wrench

The Impactool, an air-operated, torsion-bar, torque controlled tool, is a standard nut-running impact wrench with automatic control. A torsion bar is twisted to the desired stress on a simple jig, then locked with a calibration collar. Nuts are run on until the nut running resistance reaches the preset stress on the torsion bar, the impact mechanism rebounds tripping a rubber-faced shutoff valve.

Two sizes are available—a 534OT model, adjustable in a range of 14 calibrations to 550 ft-lb, or 90 ft-lb depending upon which of two torsion bars is used.

Larger tool runs both ¾ in. and ⅞ in. bolts. Its weight is 31½ lb and is 25 in. long, delivering up to 2,100 impacts per min. *Ingersoll-Rand Company, Dept. RLC, Phillipsburg, N. J.*

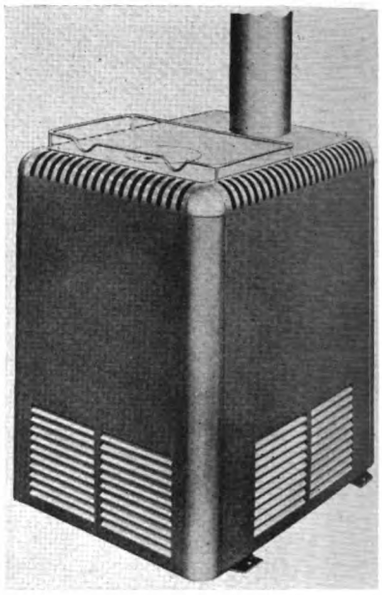
Decelostat Controller

This electronic anti-wheel slip device has been designed for application to lightweight trains where axle mounting arrangements and limited clearances prevent mounting of the AP-3 Decelostat Controller. Slip detection is by means of an alternator driven from the end of the axle. Source of the voltage developed is a magnetic pick-up impulse generator. No slip rings, brushes or rotating windings are required. Voltage proportional to speed is generated when the magnetic pick-up field is interrupted by rotation of a toothed alternator wheel. The control panel includes a means of checking the integrity of the circuits. *Air Brake Division, Westinghouse Air Brake Company, Dept. RLC, Wilmerding, Pa.*

Caboose Heater

The Superflame heater, which serves also as a cookstove, is rated at 53000 Btu and is capable of furnishing ample heat during frigid weather. It is equipped with a wide-range variable control for low heat on milder days. The unit is louvered on all sides along its top and bottom for maximum circulation of air. The heater burns number 1 or number 2 oil.

The unit is built for rough use in



cabooses and is equipped with a metering valve designed to automatically compensate for fuel overflow as the caboose is jarred during switching. Its combustion chamber is made of all-welded 18 gauge steel. Sturdy steel legs which are tapped for anchoring to the floor, set the chamber a full 6 in. off the floor. The heater is finished in a heat resistant platinum blond silicone paint. Dimensions are 30 in. high, 22 in. wide, and 28 in. deep. Its 20 in. by 16 in. cooking surface allows complete facility for cooking hot meals. *Queen Stove Works, Dept. RLC, 505 Front st., Albert Lea, Minn.*

Ratchet Lowering Jacks

These jacks are single acting in design for raising and lowering the load notch by notch, downstroke for raising and upstroke for lowering. They are constructed for heavy duty service and have a convenient carrying handle and a broad base to assure a solid footing.

(*Continued on page 80*)

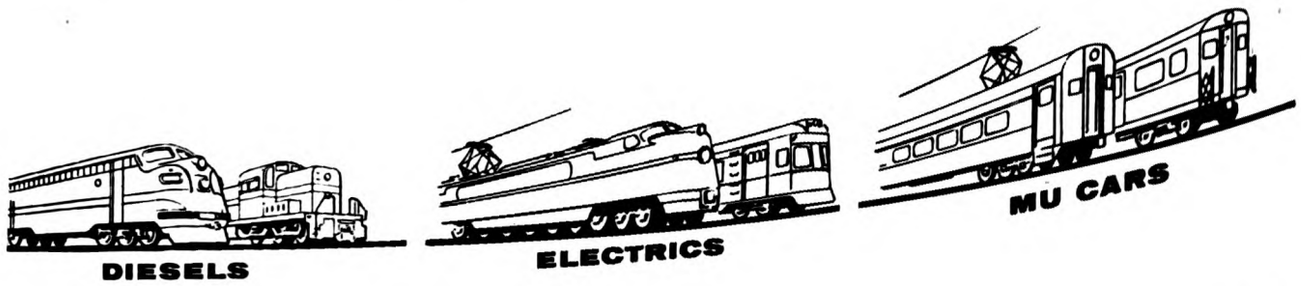
UNIT
A.A.R. Certificate No. 51

POSITIVE
A.A.R. Certificate No. 55

CHICAGO MALLEABLE'S BRAKE BEAMS

A. A. R. Y-40 Yokes and
Miscellaneous Steel Castings
Malleable Iron Car Castings

CHICAGO MALLEABLE CASTINGS COMPANY, CHICAGO 4, ILLINOIS
ALLIED STEEL CASTINGS COMPANY



ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

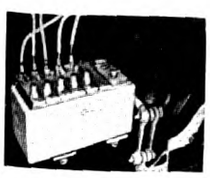
What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.

FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange Lubricators

Safety Valves

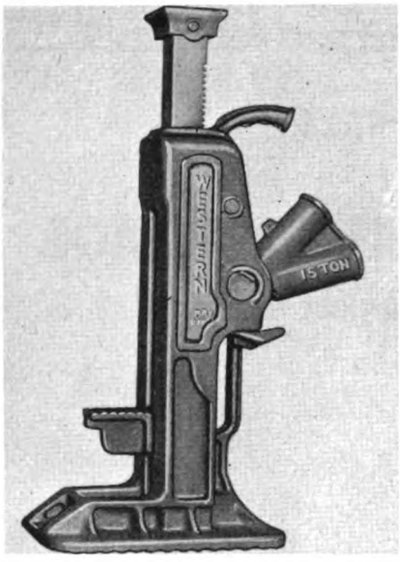
Fuel Tank Sight Gages

MAGNUS
High Mileage
TRACTION MOTOR SUPPORT BEARINGS

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

EQUIPMENT

(*Continued from page 78*)



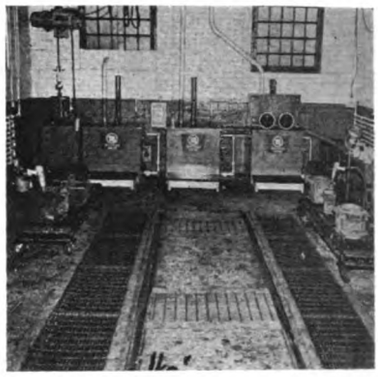
The jacks are manufactured in 5 models of from 5 to 15 tons capacity. In the fully lowered position, the lifting toe will engage load without interference by the base thereby maintaining high ratio of lift to closed weight. Heat-treated, forged steel rack bars are machined for tooth strength. Malleable iron housings with ribbed bases, multiple-toothed pawls and lever sockets with internal trunnions assure strength of jack mechanisms.

Illustrated is the model 2215-B with a rated capacity of 15 tons. Its closed height is 22 in. and it will lift 13-½ in. Base size is 7-½ in. by 11-¾ in. and it weighs 84 lb. *Western Railroad Supply Company, Dept. RLC, 2428 South Ashland ave., Chicago 8.*

Bearing and Journal Box Cleaning

At a Midwestern diesel railroad shop, old methods were being used for the cleaning of journal boxes, bearings and accessories from passenger cars and diesel locomotives. This shop was using a plain dip tank heated with a steam line and charged with soda ash and soap for the cleaning of journal boxes. One box at a time was lowered into the tank and boiled for a predetermined period. The crane, used for holding and lowering the journal box, was immobile till the cleaning was completed. An additional tank charged with solvent was used for hand scrubbing and soaking bearings and miscellaneous parts.

The old tanks have now been replaced with three mechanically agitated Aja-Lif machines and one soak tank. Wi h this equipment, journal boxes are vigorously



agitated up and down through the solution 100 motions per min for 12 to 15 min. After cleaning, the boxes are transferred to a cold water tank where they are allowed to soak and to lower the temperature of the journal box for easy handling.

The other two units, equipped with roller work carrying platforms, are used for cleaning bearings. They are installed in the shop roller conveyor system to facilitate transfer of the parts.

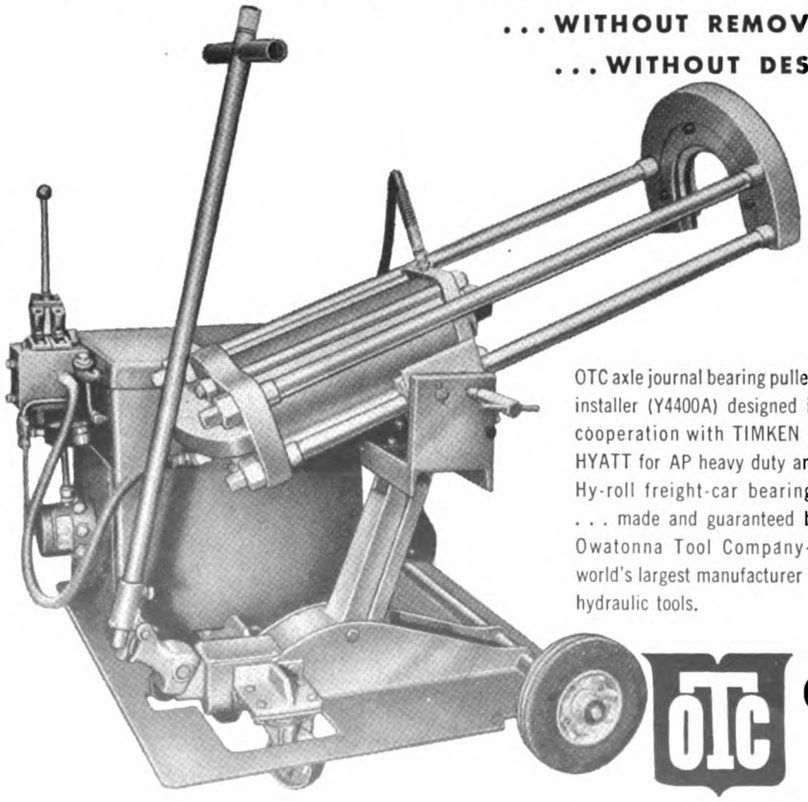
Mechanical operation of these machines is accomplished with compressed air for they are motorless and gearless. The shop is now cleaning 15 to 20 journal boxes and bearing sets per shift. All hand cleaning has been eliminated. *Railroad Division, Magnus Chemical Company, Dept. RLC, South ave., Garwood, N. J.*

(*Turn to page 84*)

NOW—ONE MAN ... can pull, install axle journal bearings IN MINUTES...

...WITHOUT REMOVING CAR WHEELS

...WITHOUT DESTROYING WHEEL FIT



OTC axle journal bearing puller-installer (Y4400A) designed in cooperation with TIMKEN & HYATT for AP heavy duty and Hy-roll freight-car bearings . . . made and guaranteed by Owatonna Tool Company—world's largest manufacturer of hydraulic tools.

Slash manhours—slash labor costs—slash lost time—with this new OTC journal-bearing puller-installer. One man has 74 tons hydraulic pressure on tap—muscle aplenty to remove even stubborn "frozen" bearings—and 53 tons pressure to press home the tightest fit.

Entirely self-contained, this OTC puller-installer rolls to the job on large wheels (two swiveling). Puller frame raises or lowers hydraulically to the right height, tilts to fit over axle-bearing assembly.

Puller-installer is complete with OTC double-acting ram, 2-horsepower electric motor, piston-type pump, 2-gallon hydraulic reservoir, 3-way hydraulic control valve, pressure gage, hydraulic lift for raising and lowering tiltable puller frame.

Complete details in OTC bulletin HYRR 57 —see your OTC representative or write

OTC

OWATONNA TOOL COMPANY

495 CEDAR STREET

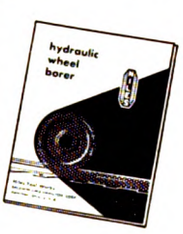
OWATONNA, MINNESOTA

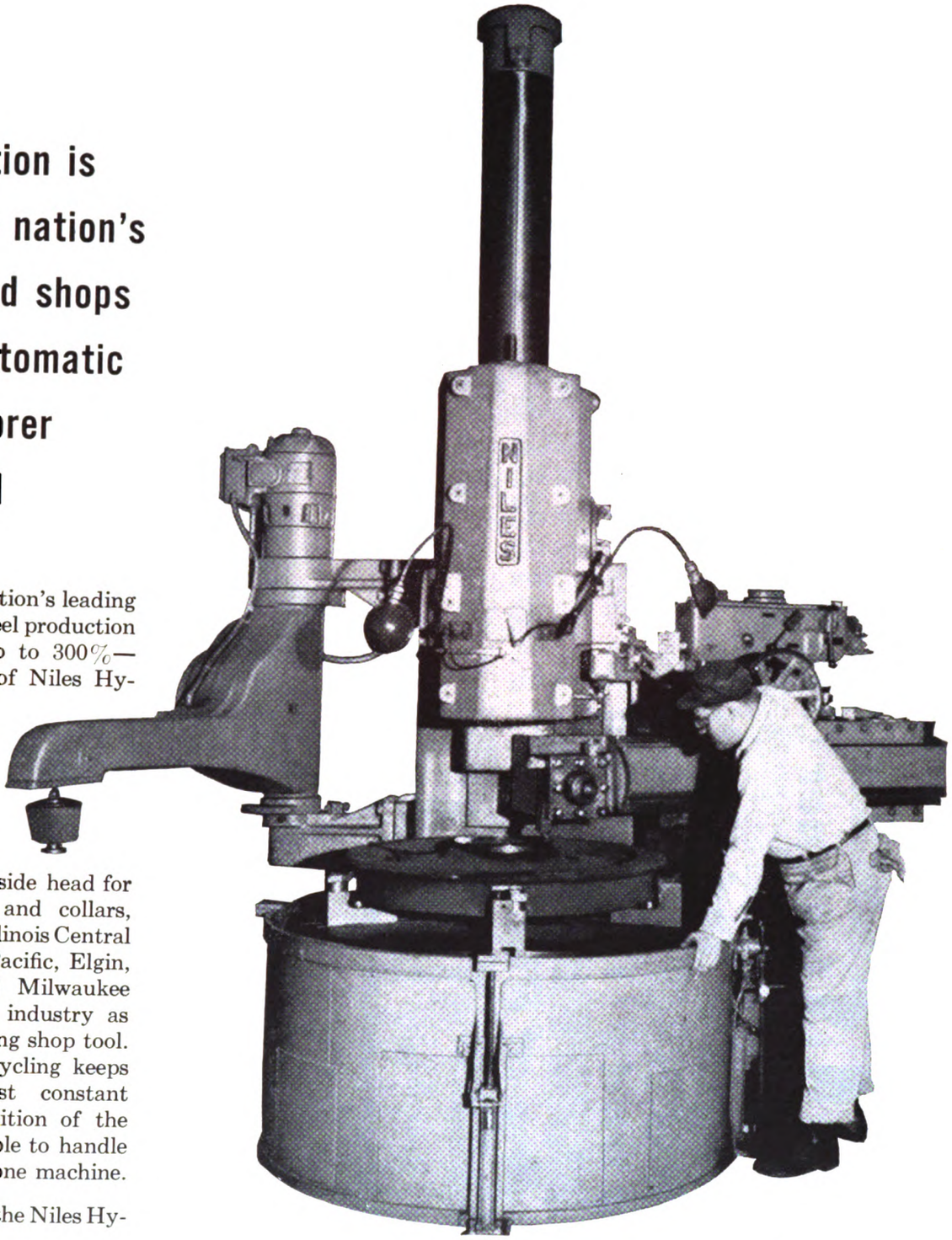
Wheel production is soaring in the nation's leading railroad shops using Niles automatic cycle wheel borer with side head

Railroad shops of the nation's leading carriers are boosting wheel production —in some instances up to 300%— thanks to installation of Niles Hydraulic Wheel Borer with side head, and to other fast, efficient Niles railroad shop tools.

Pictured here is a new Niles wheel borer with side head for machining hubs, rims and collars, recently installed in an Illinois Central shop. Soon the Union Pacific, Elgin, Joliet & Eastern, and Milwaukee Railroads will join the industry as users of this money-saving shop tool. Automatic boring feed cycling keeps the machine in almost constant operation. And the addition of the side head makes it possible to handle car and diesel wheels on one machine.

Write today for a copy of the Niles Hydraulic Wheel Borer Bulletin—with complete specifications and operating data. Find out how you can materially cut your shop costs. Address Dept. 9030.





Pictured above is a new Niles wheel borer equipped with side head recently installed in Illinois Central's Burnside shop, Chicago, Ill.

ALL OF THE NATION'S LEADING RAILROADS ARE USERS OF NILES RAILROAD SHOP TOOLS

Hamilton Division Hamilton, Ohio

BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical presses • Can making machinery • Machine tools

BALDWIN BLH LIMA-HAMILTON

there's a HUCK fastener to fit every requirement of cost, strength and function. It will pay you in labor saving and improved product, to investigate the complete line of HUCKBOLT* FASTENERS and BLIND RIVETS. We invite your inquiry.

*Trade Mark Registered

HUCK MANUFACTURING COMPANY
2480 Bellevue Avenue
Detroit 7, Michigan

FOR PROGRESSIVE RAILROADING

111,000 CARSETS TO DATE

MILLER PAD LUBRICATORS

Immediate Delivery IN Any Quantity

WINONA, MINNESOTA

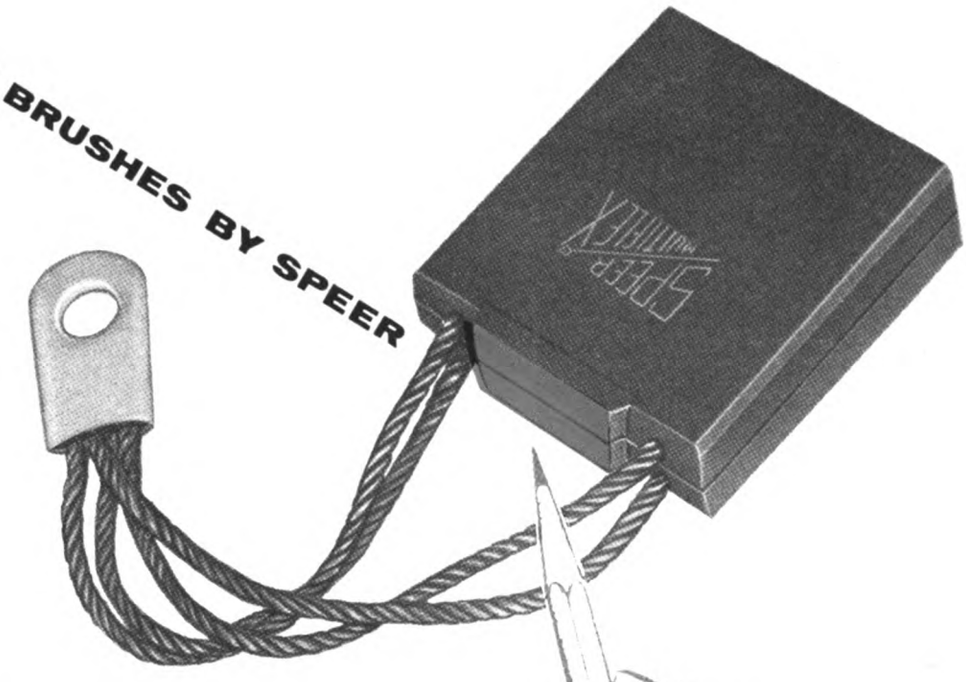
NAPANEE, ONTARIO

Your schedule of deliveries to either plant will be met as specified.

MILLER LUBRICATOR CO.
WINONA, MINNESOTA

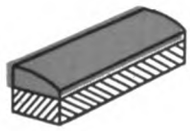
NAPANEE IRON WORKS
Napanee, Ont., Canada
Montreal, Que., Canada

NEW "RED CAP" BRUSHES BY SPEER



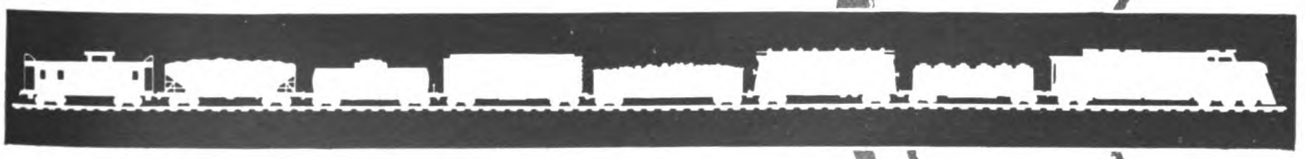
On your most rugged haul, try Speer's new "Red Cap" brushes. They are made to stand up under the toughest conditions of vibration, sudden shocks, rough roadbeds and long-haul running. Special double-duty shock absorbers take the beating...brushes themselves aren't touched. Results are longer brush life (breakage and shunt-fraying virtually eliminated), maintenance-free service, improved commutation and real long-haul reliability.

"Red Cap" brushes are yet another example of Speer's leadership in brush design. There's a Speer brush exactly right for every railroad application. Write today for details.



How "Red Caps" Work

Specially designed hard rubber cap, laminated to softer neoprene pad, is mounted at top of brush. Initial impact of vibration and shocks is broken by hard cap. Design insures even distribution of remaining pressures over entire surface of soft underpad, allowing full absorption of vibration and shocks with minimum of compression. Hard cap also resists wear and indention by spring finger, permitting free movement and most efficient operation of brush throughout its life.



SPEER Carbon Co.
St. Marys, Pennsylvania

Take a tip from
LEADING RAILROADS—
SPEED UP
DRILLING
and
TAPPING
WITH ERRINGTON
Adjustable Multiple
TAPPING and
DRILLING HEADS

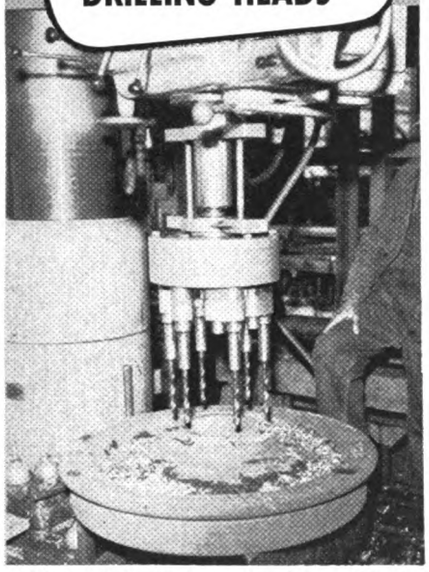


Photo of Diesel Locomotive Shop, Union Pacific R. R., shows Errington Multiple Drill holding six drills—(can also use six tap tools)—drilling passenger car wheel, to make-ready for attaching new style wheel brakes.

Here are versatile tools which permit you to take advantage of a wide range of adjustment—without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Features: Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case. All parts fully enclosed for pressure lubrication and protection. Non-slip positive clamping on all adjusting members.

WRITE FOR COMPLETE INFORMATION

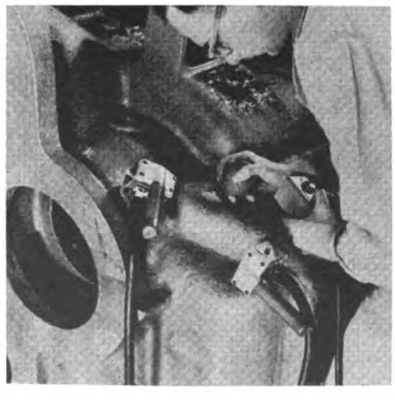
Established 1891
ERRINGTON
Mechanical Laboratory, Inc.
STATEN ISLAND 4, NEW YORK

EQUIPMENT

(*Continued from page 80*)

Quartz Tube Light Source

The 1500-watt tubular mercury quartz lamp shown was developed for New York's International Airport floodlighting. It is a completely new development in lamps designed for lighting large areas, and is made to operate in a special luminaire. The lamp-luminaire combination is expected to find wide acceptance for illuminating outdoor areas such as station parking lots, fueling stations, outdoor storage and construction areas, railroad yards, and in situations where high mounting is a requirement. It can also be used indoors in industrial high-bay areas. *General Electric Company, Lamp Division, Dept. RLC, Nela Park, Cleveland 12, Ohio.*



Permanent Magnet Leech

No. 54975 leech is said to increase efficiency by enabling one man to perform magnetic particle testing operations that formerly required two men.

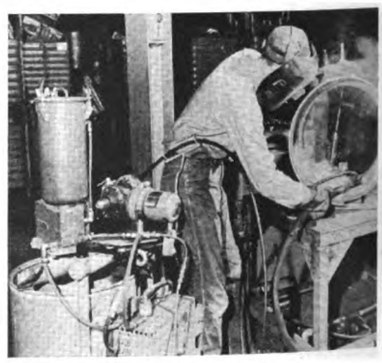
It consists of a permanent alnico magnet, cast steel pole pieces with an aluminum carrying handle, and five feet of 2/0 cable. The leech will remain and make electrical contact as long as desired on any magnetic surface, including vertical and overhead members. The magnetizing source may be a.c., d.c., or half-wave current, not exceeding 1500 amp.

The old method of dry powder magnaflux testing required two men. One man positioned a prod while another applied powder and operated a second prod. Once the leeches are in position, only one inspector is needed to operate and apply powder. *Magnaflux Corporation, Dept. RLC, 7300 West Lawrence ave., Chicago 31.*

Non-Peeling Coating

Specially prepared to be applied directly over new and unpainted galvanized, aluminum, or terne plate surfaces, this formulation called Galvinoleum Coating, is available in red, gray, green and metallic colors. The manufacturer's outside white, or any high-quality oil base house paint, may be used over the coating to match desired trim color.

The coating is said to take hold and thereby eliminate paint peeling problems. Tedious etching of the galvanized surface, as well as weathering, are now eliminated. Gutters, downspouts, siding, roofing, heating and ventilating ducts are other items that can be covered with the product. *Rust-Oleum Corporation, Dept. RLC, 2799 Oakton st., Evanston, Ill.*



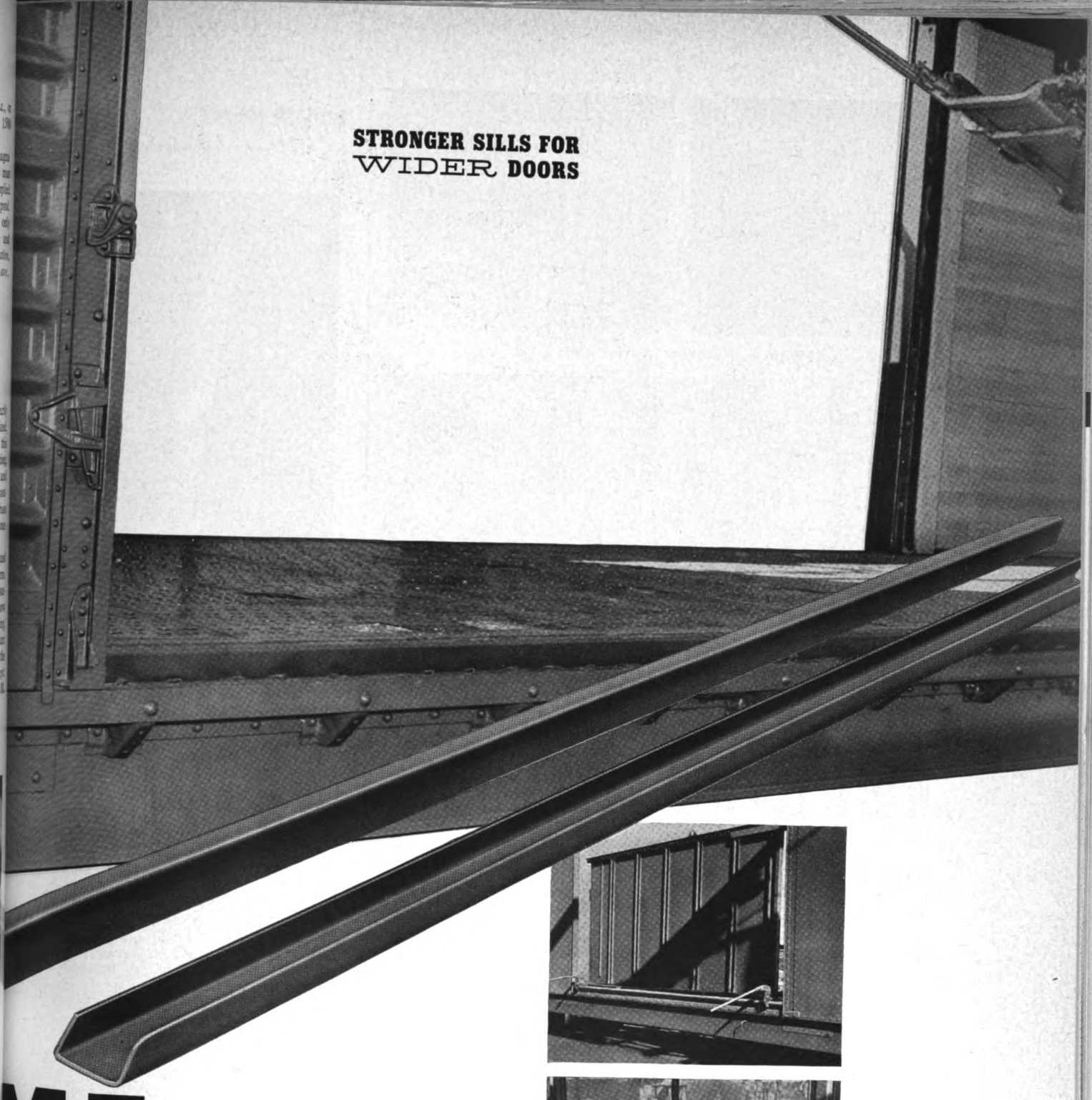
Welding Process

Unionarc welding, an electric process, is a new concept in the manual welding of mild steel. It is said to reduce welding costs 25 to 65 per cent below those of existing welding methods.

The Unionarc process uses a continuously fed bare steel wire electrode which is magnetically coated with flux and shielded by carbon dioxide. The torch can be easily handled in all welding positions—vertical, overhead and downhand. Manual welds can be made at higher speeds than with covered electrodes according to the manufacturer. Unionarc welding produces high-quality welds in steel, even when moderate amounts of rust, scale, and moisture are present. *Linde Company, Division of Union Carbide Corporation, Dept. RLC, 30 East 42nd st., New York 17.*

(*Turn to page 86*)

STRONGER SILLS FOR
WIDER DOORS

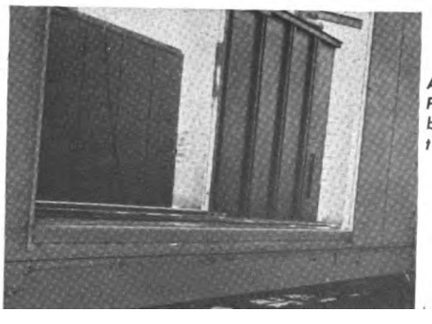


M·F

Threshold Plates

are permanently welded structural members of the car . . . they provide more rigid openings — *more necessary than ever with wider doors!*

Floor boards don't pass under the 'M-F' Threshold Plate — worn or broken floor boards are more easily and more quickly replaced . . . . . .



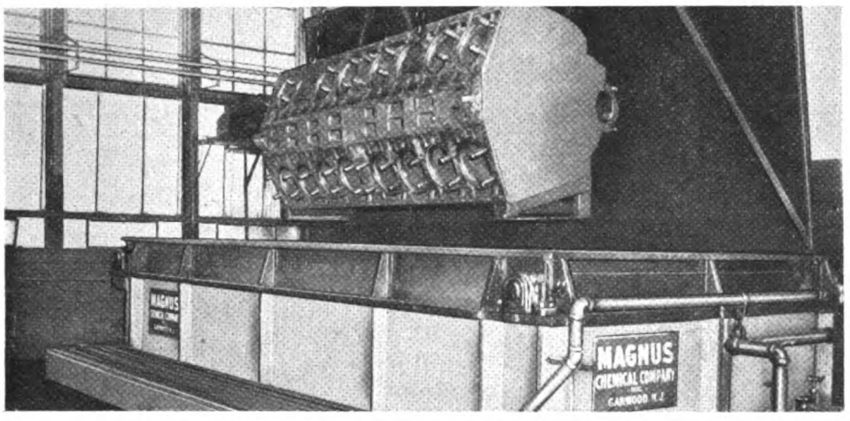
AND with the 'M-F' Threshold Plate uniform length floor boards may be used throughout the car.

MAC LEAN-FOGG

Lock Nut Company

5535 North Wolcott Ave., Chicago 40, Illinois
In Canada: The Holden Co., Ltd., Montreal

FROM the smallest injector parts



TO the largest diesel engine block . . .

MAGNUS MACHINES ARE RIGHT FOR YOUR JOB

. . . Save Labor . . . Save Money

Whatever your cleaning job . . . from the smallest injector parts to the largest diesel engine blocks . . . Magnus has the right equipment to do the job better, with less labor and less cost.

Offering a wide range of equipment, from the small, inexpensive MIJI-DIP CLEANING MACHINE, through a varied selection of flexible AJA-DIP and AJA-LIF's, to giant, custom machines capable of cleaning 6 ton diesel blocks, Magnus machines with their proven principle of mechanical agitation are the answer to lower cleaning costs in the face of rising labor costs.

SEE MAGNUS CLEANING MACHINES IN OPERATION AT A.R.S.A. EXHIBIT BOOTHS 346-347-348

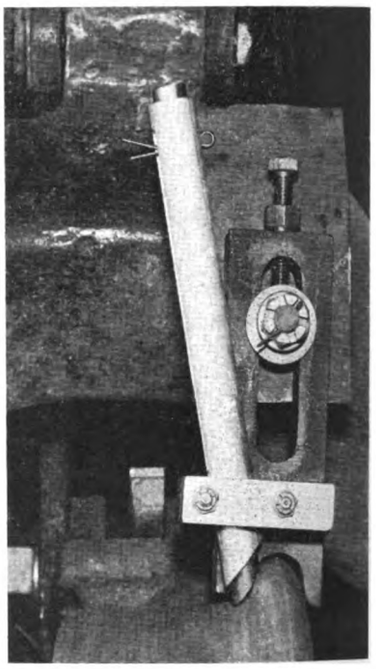
For full information on Magnus Cleaning Methods, simply write to Magnus, 77 South Avenue, Garwood, New Jersey

magnus

RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
a world-wide organization specializing in cleaning and protection of all surfaces.

EQUIPMENT

(*Continued from page 84*)



Flange Lubricator

This type TA flange lubricator is claimed to offer greater ease of installation, and a swivel mounting which eliminates clearance problems and permits replacement of the dry molybdenum disulfide stick lubricant without removal of any part.

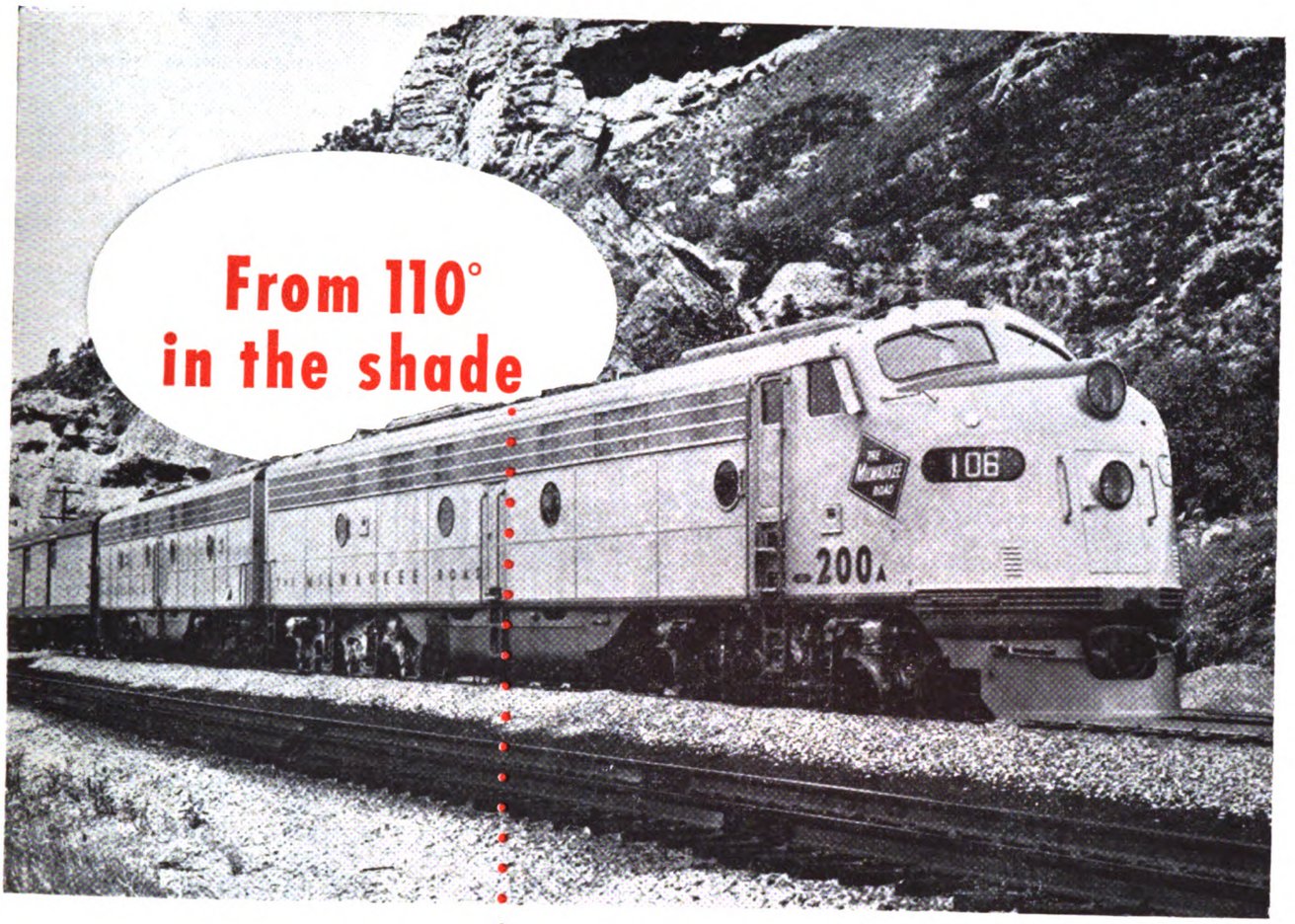
The lubricator interferes in no way with the application of new brake shoes. Adjustment of guide shoe is simplified and positive, and suspension mounting prevents grabbing and chaffing while applying lubricant smoothly and uniformly. "Moly-Stick" lubrication is said to possess high film strength under extreme pressures, and will not pick up dirt or sand. *National Aluminate Corporation, Dept. RLC, 6190 W. 66th Place, Chicago 38.*

Hydraulic Jacks

These hydraulic jacks, designed for horizontal or vertical operations, are available in 14 models, ranging from 3 to 100 tons' capacity. The light duty models from 3 to 20 tons have single speed control. Two-speed control is standard on all other models. Suitable valves afford positive control of ram under all loads. Spring retainers keep ball valves in seated position when unseated by hydraulic operation of pumps or release valves.

Hydraulic fluid used in the jacks is compounded to give maximum protection against sluging or oxidation, rusting and foaming. It will flow and lubricate at sub-zero temperatures. All jacks in the line can be fitted with pressure gauges. Dials can be calibrated to indicate total

(*Continued on page 88*)



to 40° below
PROTECTED BY SINCLAIR

During some of The Milwaukee Road's long runs of over 2200 miles from Chicago to Seattle and Tacoma, altitudes range from sea level to 6000 feet; frequently temperatures vary from 40 below zero to sizzling 110° heat.

It's a tough test for Diesels — and for Diesel lubricating oil. That's why The Milwaukee chooses Sinclair GASCON® Diesel Lubricating Oil to lubricate and protect many of its mighty Diesel engines.

Fact is — over 100 leading U. S. railroads use Sinclair GASCON Oils. Because of this wide popularity, GASCON Oils have become established as a *standard of comparison* for Diesel lubricating oil performance.

It's time that you, too, looked into the advantages of Sinclair GASCON Diesel Lubricating Oils and Diesel Fuels.

SINCLAIR RAILROAD LUBRICANTS

Sinclair Refining Company, Railway Sales, 600 Fifth Avenue, New York 20, N.Y • Chicago, St. Louis, Houston

IDEAL

SHORTCUTS to better commutator maintenance

QUALITY-BUILT TO DO THE JOB RIGHT! . . .

The easiest way to restore commutators in traction motors and generators without dismantling during interim maintenance...or during periodic overhauls. IDEAL Resurfacers and other tools are used by leading railroads and recommended by locomotive builders.

RESURFACERS

Refinish commutators to like new condition even when ridged, scored or burned. Wood block handles clamp rigidly into grinder. Seven sizes, in all grades from extra coarse to extra polish.

MICA UNDERCUTTERS

Work easily in close quarters. Several models. Direct drive or by flexible shaft. For use with IDEAL Commutator Saws and Milling Cutters.

FLEXIBLE ABRASIVE

Cleans and burnishes commutators. Non-dusting. Complete size range.

CLEANER-BLOWERS

Blows air at high velocity and harmless low pressure. Lightweight and rugged. May also be used as a vacuum cleaner or sprayer. Three models: ⅖, ⅔ and 1⅓ H.P.

FREE 39-page Handbook
Complete information on commutator maintenance.
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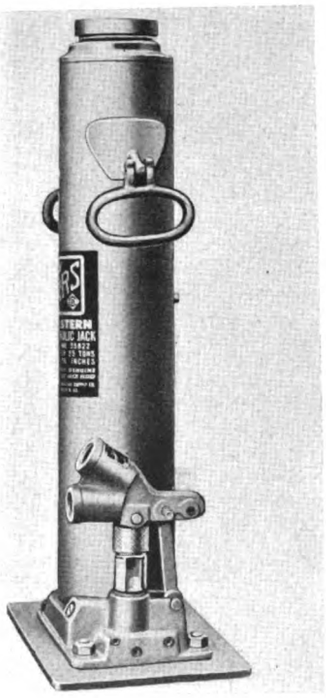
Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

EQUIPMENT

(*Continued from page 86*)



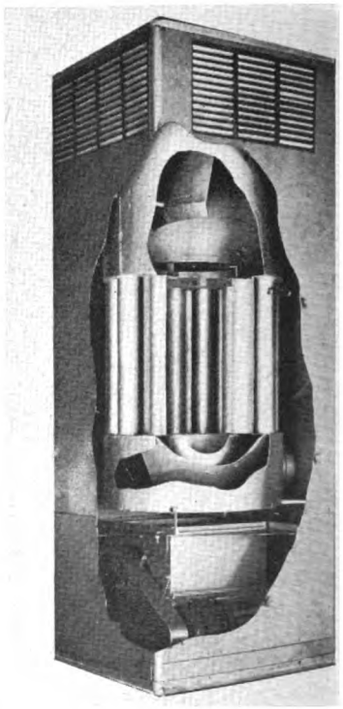
load in tons or the pressure per sq in. within the jack cylinder.

Illustrated is the model 25B22 with a rated capacity of 25 tons. Its closed height is 22 in., hydraulic lift is 16 in. Its base size is 10 in. by 12 in. and weight is 112 lb. Fluid capacity is approximately 3 pts. *Western Railroad Supply Company, Dept. RLC, 2428 South Ashland ave., Chicago 8.*

Speed Indicator

The model S speed indicator, was designed for locomotives, multiple unit, self-propelled and electric rail cars. Speeds are indicated directly to the operator in mph or kph, depending on the model installed. Model S-80 is calibrated 10 to 80 mph, while model S-120 is calibrated 10 to 120 mph. The model SK-120 is calibrated for speeds from 10 to 120 kph.

The device includes an axle drive unit, a flexible drive shaft and an indicator instrument. Its actuating mechanism consists of a ball governor mounted on a revolving shaft. The unit's 5-½ in. diameter dial is mounted in a chrome plated case, sealed for dust and waterproof protection for the ball bearing mounted mechanism. It is said to be ruggedly designed for severe service applications with only minimum lubrication maintenance required. *Barco Manufacturing Co., Dept. RLC, 500 North Hough st., Barrington, Ill.*

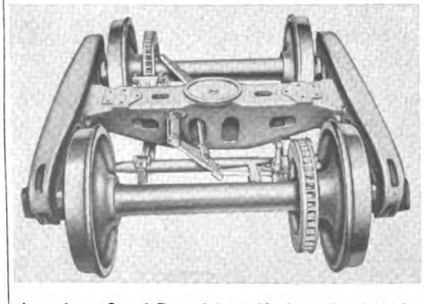


Space Heater

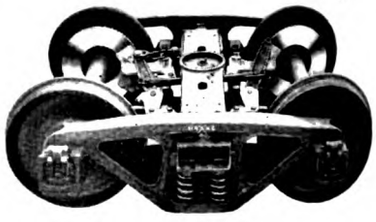
The Waikiki space heater is available in oil- and gas-fired models with an output of 200,000 and 500,000 Btu per hour. Compact and versatile, it can be installed vertically in an unused corner or hung horizontally from the ceiling. It can be

(*Continued on page 90*)

Off-Tread Freight Car Brakes Exhibited



American Steel Foundries off-the-wheel brake is designed for freight car trucks.



Buffalo Brake Beam's mechanical disc Brake-X has 15 months' freight service.

On express lines . . . and at whistle stops . . .

The performance and the brand are the same around the world

Other Outstanding Shell Industrial Lubricants

Shell Tellus Oil—for closed hydraulic systems

Shell Alvania Grease—multi-purpose industrial lubricant

Shell Turbo Oil—for utility, industrial & marine turbines

Shell Dromus Oils—cutting oils for high-production metalworking

Shell Rimula Oil—for heavy-duty diesel engines

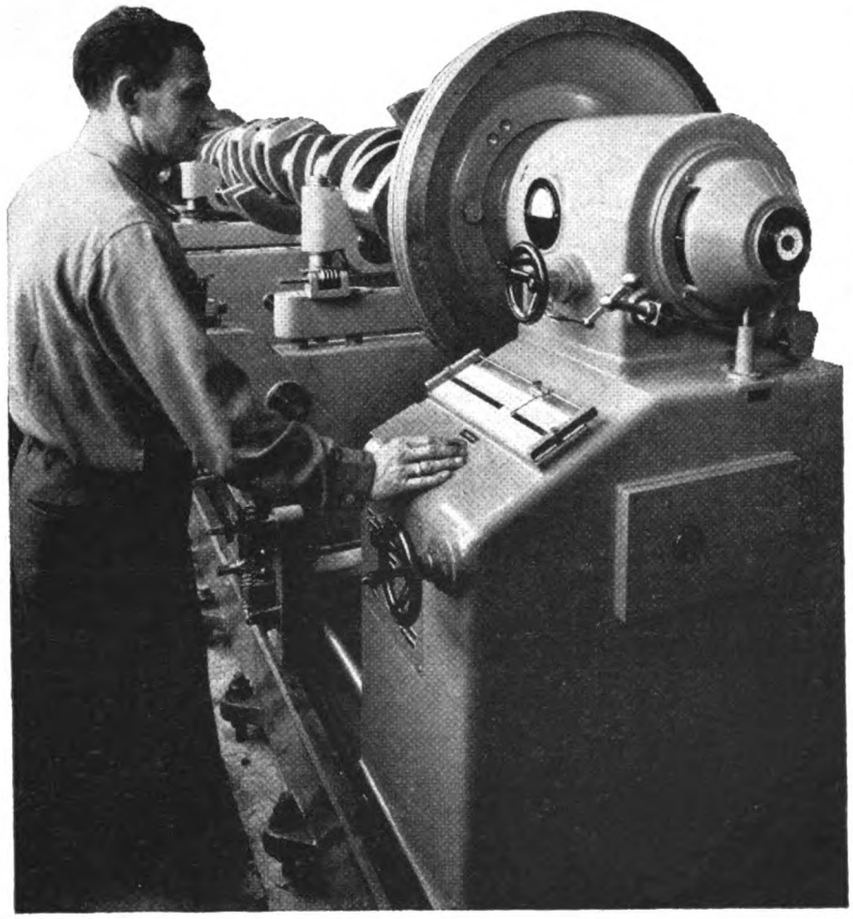
SHELL TALONA R Oil 40 offers two outstanding reasons for its acceptance as a top-rated diesel-electric locomotive lubricant. It provides superior anti-wear protection and maintains engine performance.

Greatly reduced wear on pistons, rings and cylinder liners is assured because of the selected combination of additives used in Talona® R Oil 40. It has high oxidation stability, combined with resistance toward corrosion and sludge formation. It prevents ring fouling and provides excellent detergent-dispersant action.

Today—railroad operators abroad can enjoy the same Talona R Oil 40 the domestic carriers rely upon. For complete information, write to Shell Oil Company, 50 West 50th St., New York 20, N.Y., or 100 Bush Street, San Francisco 6, Calif.

SHELL TALONA R OIL 40

SHELL

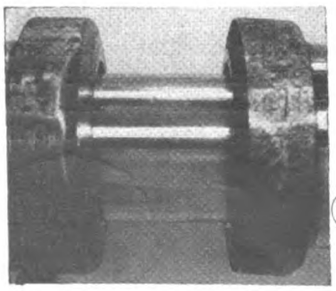


THIS REBUILT CRANKSHAFT IS DYNAMICALLY BALANCED BY A NATIONAL FORGE SPECIALIST

The same close tolerances that we apply to new crankshafts govern your National Forge *reconditioned shafts.* They, too, are dynamically balanced to *original requirements* after they have been straightened, ground, chromium plated, and ground and polished.

Because National Forge is a specialist in both new and reconditioned crankshafts, we can guarantee your rebuilt shaft will meet the original shaft's specifications.

May we quote on your next job?



This is a finished, repaired crankshaft after processing by National Forge.

For more details on crankshaft repair, write for Bulletin RC-2.

NATIONAL FORGE
AND ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.

EQUIPMENT

(Continued from page 88)

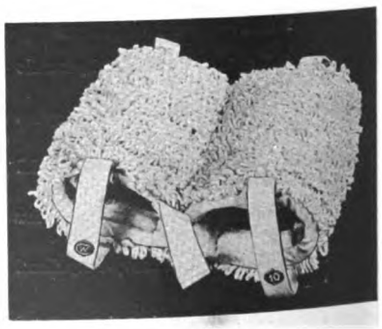
used with or without ducts. Heat can be directed where it is most needed or spread throughout an entire room. *Vapor Heating Corporation, Dept. RLC, 6420 West Howard st., Chicago 31.*

Draft Gear

This friction draft gear, the Mark 40, which fits standard 24⅝ in. pockets in freight cars and has over 40,000 ft lb of capacity, has been conditionally approved by the AAR. Its official capacity is rated at 42,420 ft lb.

The gear has a reaction force or sill pressure well under 500,000 lb, which is within coupler strength. It has 3¼ in. of travel and is used in combination with a special follower having a ½ in. offset which allows the standard coupler and yoke to be pulled forward ½ in., providing 3½ in. horn clearance. The gear is self-contained and pre-compressed for easy installation.

The new gear follows the proved principle of a coil spring actuated mechanism. Its unusually high capacity was accomplished through a new combination of sturdy heat-treated alloy steels, both in the friction elements and the housing, and the longer travel within the standard pocket. *Cardwell Westinghouse Company, Dept. RLC, 332 S. Michigan ave., Chicago 4.*

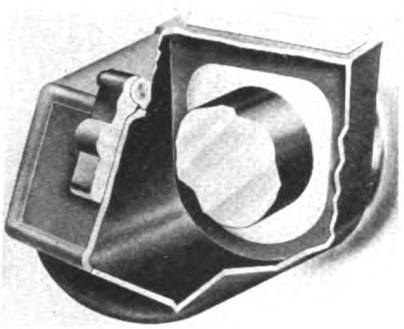


Journal Lubricator

This journal lubricator is approved by the AAR for limited application in interchange service. It has no specified top or bottom, or front or back. To position

it correctly within the journal housing, it is only necessary to place the lubricator so that the dividing line of the device is parallel with the axle. The product is made of 100 per cent cotton wicking backed by looped Neoprene bodies into which steel springs are molded.

Tests showed no displacement on impact, or freezedown. Its resiliency is said to provide constant journal contact with complete wetting and positive lubrication protection to the entire journal. The lubricator has high oil absorption capacity and is simple to remove, service and renovate. *Cardwell Westinghouse Company, Dept. RLC, 332 S. Michigan ave., Chicago 4.*



Dust Guard

The Turco dust guard is a one-piece chemical journal-box seal and plug. A resilient foam-type plastic material that absorbs and holds oil, the Turco dust guard protects the journal against entry of dust, water, brine, corrosive liquids, fumes and other contaminants. Because it extends up and out of the dust guard well, it acts as its own plug.

Being composed of an easily compressible material, it is actually forced into the well. The Turco dust guard is approximately double the thickness of the ¾ in. dust guard well. Its oil-retaining qualities reduce friction at the dust-guard seat. Movement of the axle within the box under load impact does not prevent effectiveness of the seal because the guard is distorted and moves readily and rapidly under such conditions. This dust guard is composed of an inert cellular plastic that is not reactive to oil, solvent, water or air. *Turco Products, Inc. Dept. RLC, Terminal Annex 2649, Los Angeles 54, Calif.*

Corrosion Inhibitor

This diesel cooling system corrosion inhibitor, Nalco 40, is claimed to be effective for corrosion prevention in diesel and other closed cooling systems as Nalco 39 inhibitor. The new material is a high-solubility, non-chromate pulverized material. It is available in liquid, pellet and pulverized forms. It protects

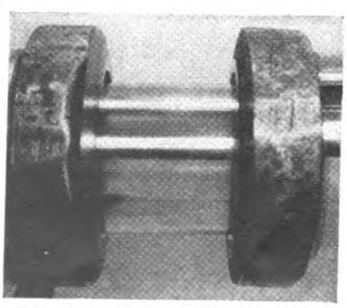
(*Continued on page 92*)

THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1911 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-1



This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE AND ORDNANCE COMPANY

Irvine (Warren County), Pa.

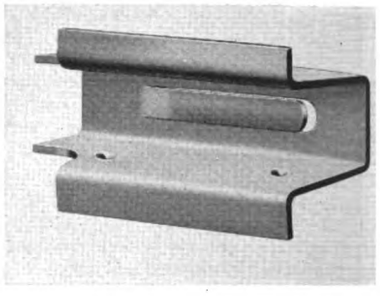
ferrous and non-ferrous metals, does not harm non-metallic materials used in cooling systems, contains no chromates, and is compatible with anti-freeze solutions. *National Aluminate Corporation, Dept. RLC, 6190 W. 66th Place, Chicago 38.*

Brake Beam Wear Plate

The Unit S-C wear plate, designed to control lateral movement of a hangerless brake beam under every operating and braking condition, utilizes a rugged spring extending into the wear plate, and in line with the vertical plane of the extended end of the brake beam

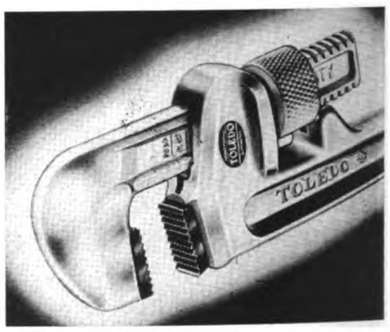
With the brake beam in normal released position in the side frame guides, these wear plate springs make no contact with the brake beam ends, so that the typical Unit operation is in no way affected.

When a brake application is made, however, the slightest lateral movement of the brake beam is immediately compensated by the corresponding spring in the direction of the movement, resulting in the brake beam being pushed back to its centered position. This prevents the brake shoe from climbing the wheel flange during braking, one of the major causes of excessive flange and brake shoe wear.



Because the spring and the wear plate itself are an integral fabrication, the S-C wear plate requires no service or adjustment, and the spring will maintain its specified deflection. The S-C wear plate is interchangeable with any Unit wear plates now in service. *Buffalo Brake Beam Company, Dept. RLC, 140 Cedar st., New York 6.*

(Products below are from companies not exhibiting at ARSA show.)



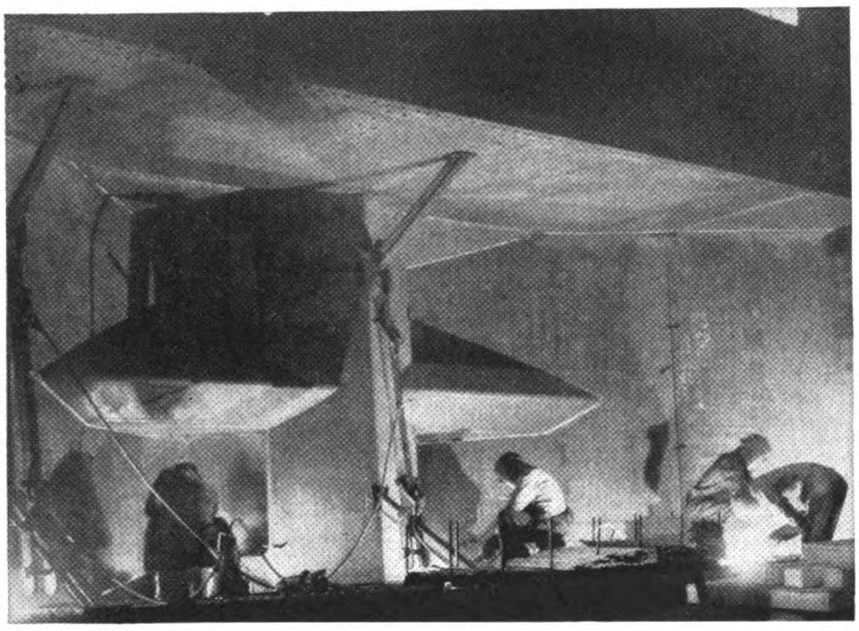
Aluminum Wrenches

These heavy-duty aluminum pipe wrenches, available in 10-, 14-, 18-, 24- and 36-in. sizes, are said to weigh less than half that of conventional and comparable malleable or steel wrenches. The wrenches feature an aluminum handle, housing and hook with replaceable forged steel insert jaws and a forged heavy-duty nut on the 10-, 14-, and 18-in. sizes, and a choice of forged aluminum housing and handle, forged aluminum hook with forged steel replaceable jaw inserts or forged steel hook on the 24- and 36-in. sizes. All models can be supplied with replaceable insert jaws of beryllium copper, non-sparking, for safety work. *Toledo Pipe Threading Machine Company, Dept. RLC, 1445 Summit st., Toledo 4, Ohio.*

Fiberglas Armature Banding Tape

Glass banding tape made with parallel glass fibers is now being used for replacing steel wire for banding armatures. They are made of Owens-Corning Fiberglas non-woven parallel glass yarns impregnated and bonded with General Electric Permafil polyester. They are

(Continued on page 98)



FOR DEPENDABLE WELDS

cover all your electrode needs with Lincoln

• *Fast, easy operation on AC or DC*

• *Good slag control— easy cleaning*

• *High deposition rate, more weld per rod*

E-6011 Fleetweld 35. For high speed, flat position or overhead butt and lap welds. Deep penetration, excellent arc stability. Good slag control and removal.

E-6012 Fleetweld 7. For all position welding of mild or low-alloy steel. High melt-off rate and low spatter. Ideal where fit-up is poor.

E-6014 Improved Fleetweld 47. Fast, easy operating, all-position iron powder electrode gives excellent bead appearance, extremely easy slag removal. 10% to 30% faster than conventional E-6013 electrodes. Up to 30% more weld per rod.

E-6024 Jetweld 1. Easy operating iron-powder electrode with high impact properties. For flat and near flat position work. Self-cleaning. Has smooth, stable arc action. Exceptionally high deposition rate.

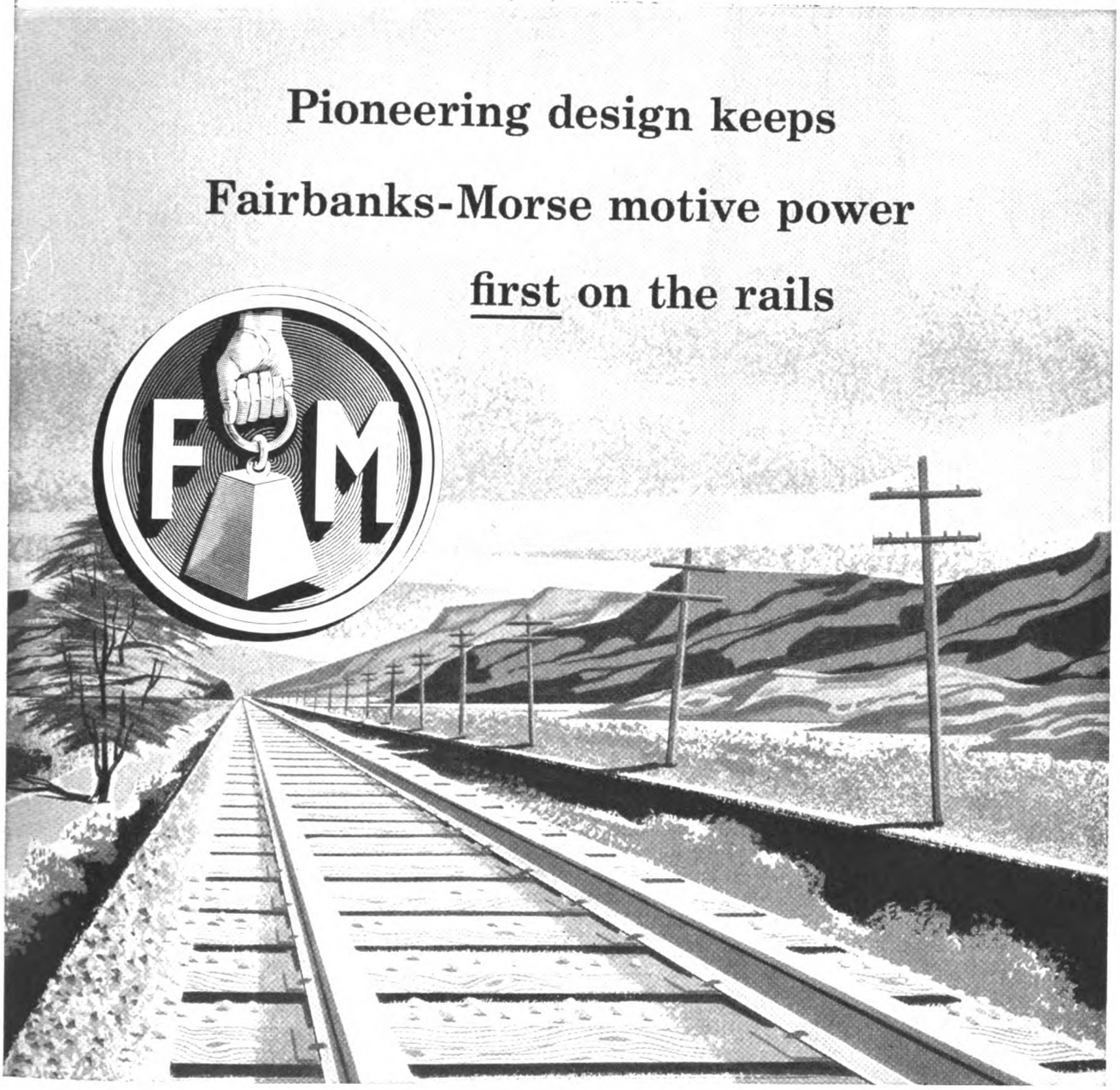
Send for Weldirectory SB-1351. Write Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio. Railway representatives of

THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

Pioneering design keeps Fairbanks-Morse motive power first on the rails



F-M Diesel Engine Firsts

First with all-aluminum bearings

First with completely counterbalanced crankshaft

First with explosion-proof crankcase

First with an oil-tight engine

First to standardize on maintenance-free air filters

Each of these design advances was first available to the railroad industry in the Fairbanks-Morse Opposed-Piston Diesel.

Each is now standard in today's locomotive O-P engine.

This is the pattern at Fairbanks-Morse—Pioneer the Future . . . Improve the Present.

Through the F-M Unit Exchange Program these and many other design improvements in the O-P, and accessory groups, are available to you *now*.

In minimum time, at minimum cost, you can upgrade your F-M power with the only engine that is better than the O-P you now have—an Opposed-Piston Diesel made better *by Fairbanks-Morse*. Write: F-M Unit Exchange Program, Fairbanks, Morse & Co., Dept. RLC-9, 600 S. Michigan Ave., Chicago 5, Illinois, for details.

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a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS
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BARBER STABILIZED TRUCKS

are easier to service

STANDARD CAR TRUCK COMPANY, 332 S. Michigan Ave., Chicago 4
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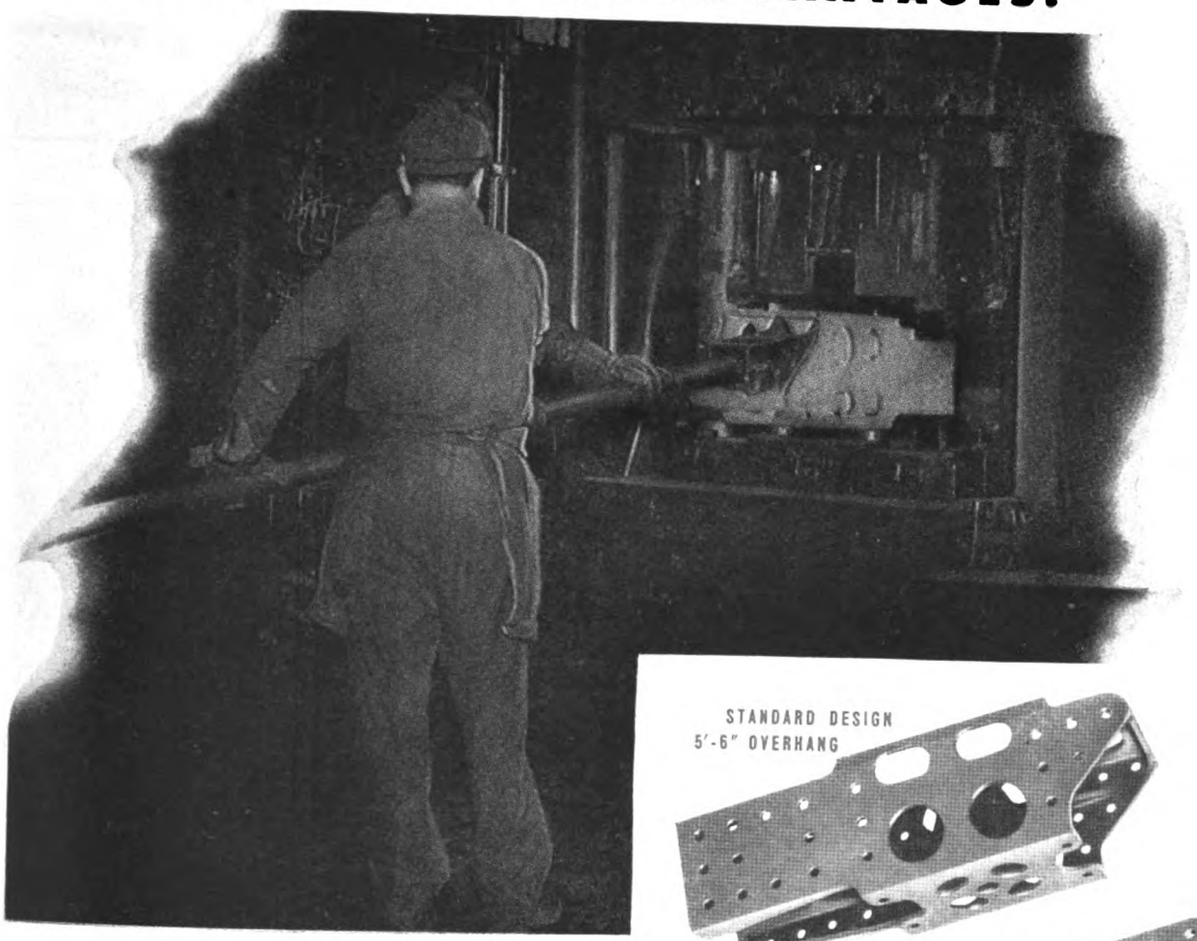
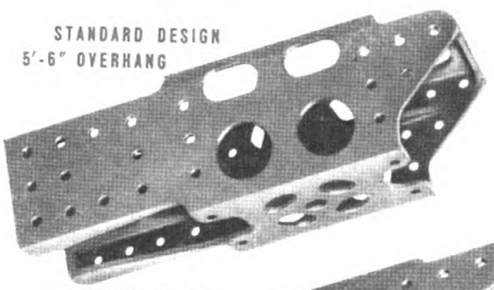
RAILWAY LO...

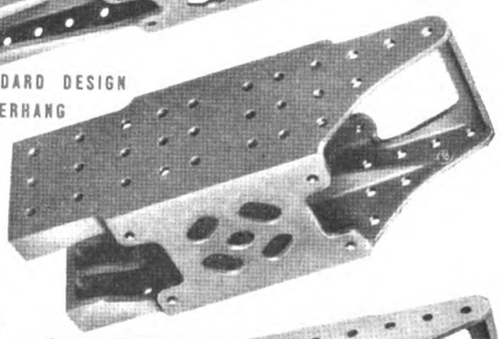
Check the **ECONOMICAL ADVANTAGES!**



STANDARD DESIGN
5'-6" OVERHANG



STANDARD DESIGN
5'-0" OVERHANG



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HOT DIE PRESSED
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One or Two Piece Design . . For Riveted or Slot Welded Application

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- ✓ CLOSE TOLERANCES
- ✓ MINIMUM WEIGHT
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- ✓ ALL FIT SURFACES SQUARE
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FOR COMPLETE INFORMATION
ON STANDARD OR SPECIAL DESIGNS . . CALL or WRITE

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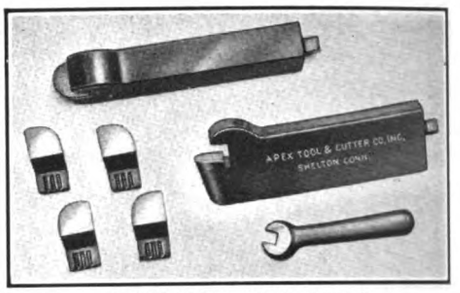
APEX INSERTED-BLADE METAL-CUTTING TOOLS

FOR ALL RAILROAD NEEDS

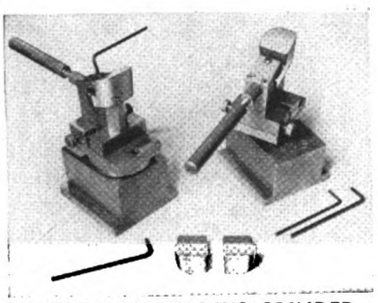
Metal cutting in railroad shops is constantly being speeded up, and at the same time materially reduced in cost, by the adoption of Apex Inserted-Blade Metal-Cutting Tools. Some of these tools are illustrated here; many others are shown in our railroad catalog, available on request.

Apex tool bits can be quickly changed because the holder does not have to be removed from the post. Finished tools of H. S. Steel, Supercobalt Steel, or with carbide tips, may be had in a great variety of types. Holders and tools for rails, or form tools for wheels, are all drop-forged of selected steels, and come finished ready for use.

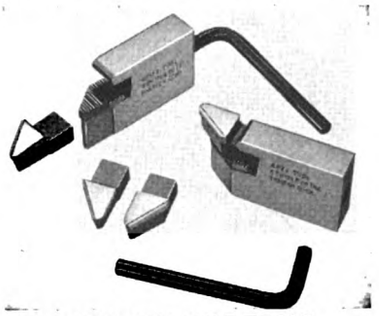
THE APEX TOOL & CUTTER CO., SHELTON 22, CONN.



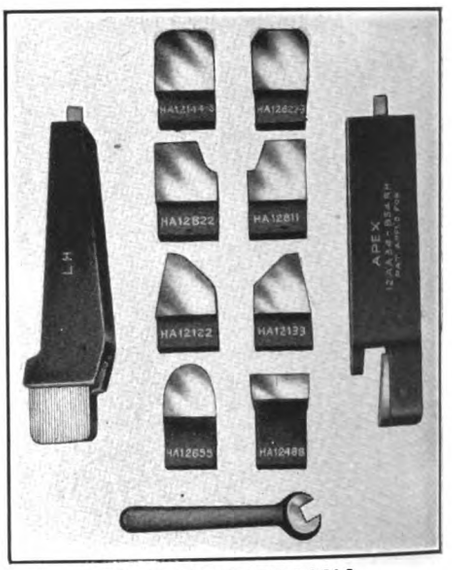
STANDARD AXLE TOOLS



AXLE TOOL RADIUS GRINDER



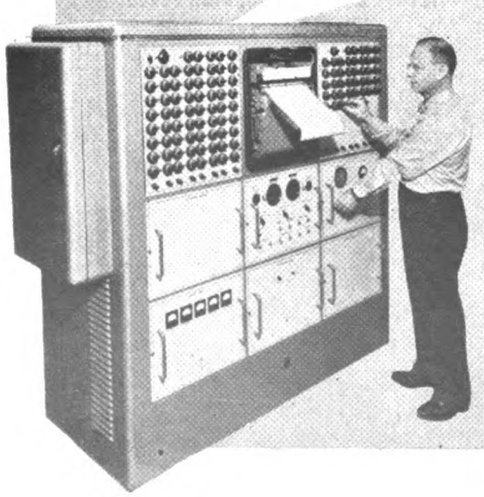
"SELLERS" AXLE TOOLS



RAIL AND FROG TOOLS

Lubricating Oil Analyses

BY AUTOMATION!



Let us help test your diesels accurately, rapidly and at surprisingly low cost. Our complete Spectrographic facilities and the world's largest Quantometer are ready to analyze your lubricating oils for any 8 metallic elements for $4.85 per sample within the same day as sample is received. We are also equipped for viscosity tests, pentane insoluble, and neutralization value. Plastic bottles for convenient sample transmittal are supplied gratis. Contact us today to learn how we can aid your maintenance department.

Teletype PG-544, Phone FRemont 1-2345 or write today for complete information.

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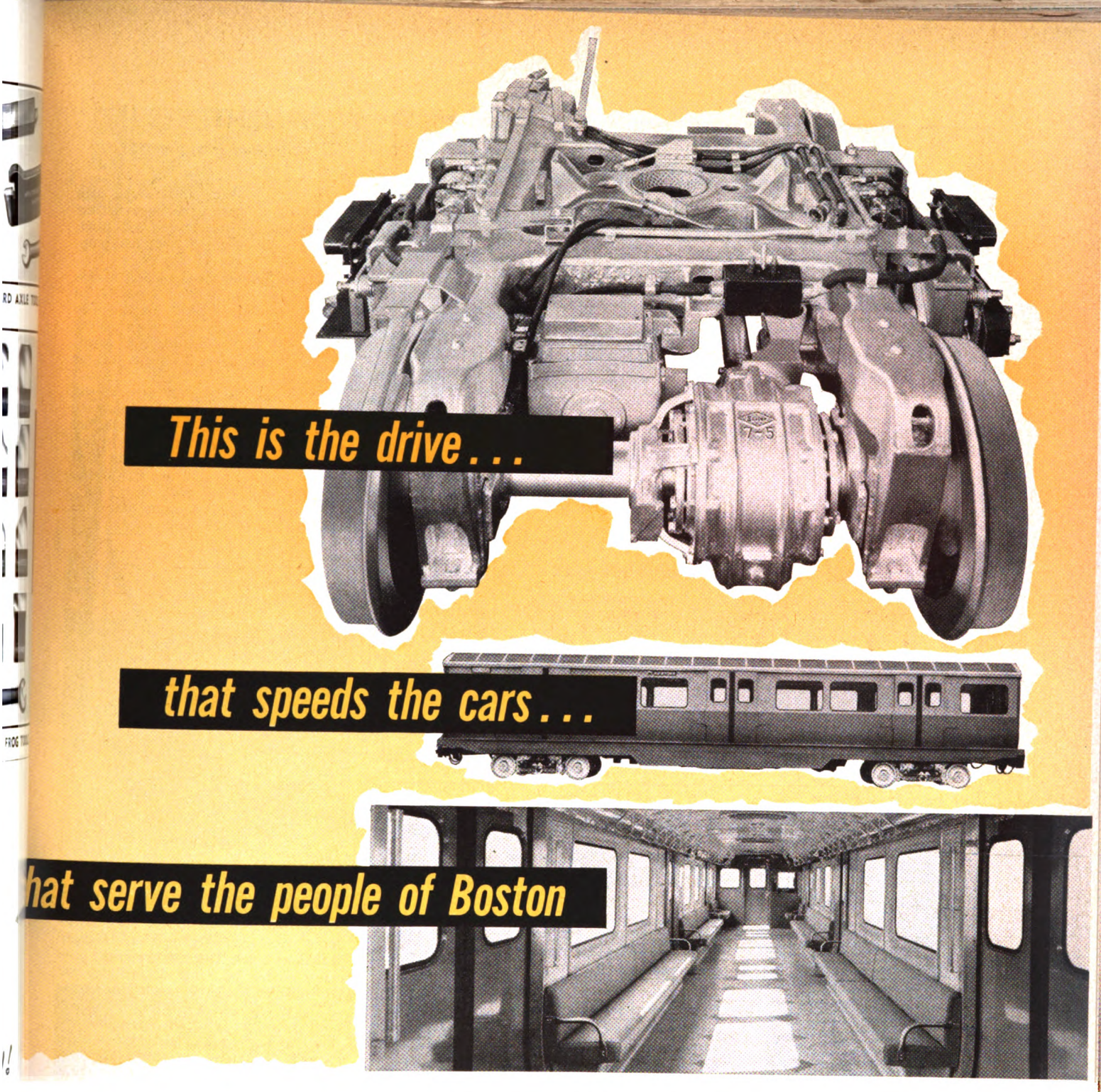

The Spicer Model 7-5 Traction Motor Drive now is in use in 50 new Pullman-Standard traction cars serving the Metropolitan Transit Authority of Boston, Mass.

This is a new Spicer Drive, developed to take advantage of the weight savings that are being incorporated into Rapid Transit car design through the use of lighter weight, higher speed electric motors.

The drive can accommodate hypoid gearing in ratios from 5.67 to 1 up to 9 to 1. The unit is furnished completely assembled, requiring no field adjustment, bearing alignment, or gear setting when installed.

More than 13,000 Spicer Drives of several types are now in use throughout the world. Write for technical bulletins, stating your requirements.

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DANA PRODUCTS Serve Many Fields:

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NDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, ear Boxes, Clutches, Forgings, Stampings.

VIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

AILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed eel Parts, Traction Motor Drives, Forgings, Stampings.

GRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, rtches, Forgings, Stampings.

ARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

any of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

DANA Spicer

NOW! We Can Service Your Traction Motor Field Coils

WITH EPOXI-MICA INSULATION

GIVING

1. HIGH DIELECTRIC STRENGTH.
2. HIGH THERMAL STABILITY.
3. EXCELLENT HEAT TRANSFER.
4. MOISTURE AND CHEMICAL RESISTANCE.
5. HIGH MECHANICAL STRENGTH.

New and rebuilt field coils can be supplied cast to pole pieces.

First to service the largest railroads with this EPOXY insulation.

MOTOR COILS MFG. CO.

401 Martindale St. Pittsburgh, Pa.

What's behind the trend to D.C. Hi-Potential Testing?

- **Over 20 railroads are now using from one to six TAKK D.C. insulation test sets in daily operations.**
- **Canadian Pacific, Norfolk & Western, New York Central, Illinois Central, Canadian National, Santa Fe, Southern and Union Pacific are a few of the progressive roads now using these sets.**

THREE BIG ADVANTAGES OF DC TESTING:

- Unlike AC, it shows relative condition of insulation and effectiveness of corrective measures.
- Unlike AC, it will not damage sound insulation.
- Like AC, it fully meets ICC requirements for annual over-voltage tests on all locomotive electrical equipment.

THE TAKK 5-KV SET (photo) performs standard resistance and over-potential tests on electrical systems of 5,000 volts and under. Its continuously variable voltage range and accurate and rugged micro-ammeter make it suitable for testing anything from the smallest test sample to the largest traction motor or diesel electric generator. It shows insulation leakage currents likely to be encountered in almost any test . . . from 0.01 micro-amperes to 1.0 milliampere.

SMALL, LIGHT AND RUGGED. The TAKK set combines complete portability (less than 1 foot cube, weighs less than 15 pounds) with accuracy, ruggedness, easy operation and moderate cost. Powered from a standard convenience outlet, it's completely safe for both operator and equipment. For heavy electrical equipment, higher voltage TAKK sets rated at 15, 30 and 45 KV are in widespread use.

FREE REPRINTS ON DC TESTING give an unbiased picture of advantages. Write today to: The Hewson Company, Inc., 433 Broad St., Newark 2, N. J. Or call HUmboldt 3-3000.

Prevent Electrical Equipment Insulation Failures with Proved Takk D.C. Test Sets

HEWSON

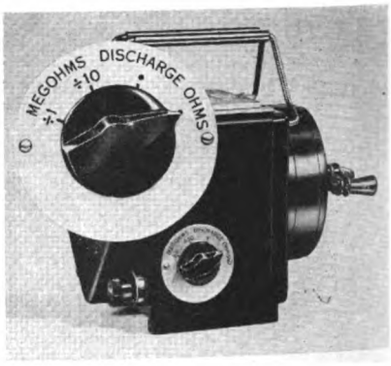
EQUIPMENT

(*Continued from page 92*)

intended for use as a high tensile, high modulus, low elongation, high impact strength, thermosetting tying and banding tape with excellent electrical properties.

The tape, known as Res-i-glas, is supplied in soft flat ribbon form. It is supplied semi-cured and requires no interleavers. The polyester reinforces the glass yarns, adding considerable tensile strength to the glass filaments in the cured stage.

In the cured stage, the tape is stiff and springy, and so hard it may be machined. To terminate the tape before cure, a hot soldering iron is used to fuse layer to layer. The tape bonds to itself after 20 minutes at 280 deg F. *Chicago Printed String Company, Dept. RLC, 2300 Logan Blvd., Chicago 47.*



Versatile Insulation Tester

A four-position switch has been introduced on the Meg-type of Megger insulation tester. The hand-operated generator models now provide facilities not formerly available in one instrument.

The A-R-K switch includes: A —megohms ÷ x 1 and ÷ x 10; R —ohm scale and K —capacitance discharge switch. In addition, there are earth, line and guard terminals so arranged as to require no change of connections when switching to the ohm scale.

The ratio or A switch divides by 10 the regular megohm scale. Thus an instrument having a normal range of 1 to 1,000 megohm scale. Thus an instrument having a normal range of 0 to 1,000 megohms also has, with the ratio switch, a range of 0 to 100 megohms, permitting insulation resistance measurements down as low as 10,000 ohms.

The discharge of K switch permits the discharge of capacitance in the apparatus under test. This charge is built up during the test because the test voltage is d-c.

The ohm or R scale has a range from 0 to 10,000 ohms. With it, tests can be made of conductor resistance without resorting to other test equipment, often an advantage when trouble shooting in

(*Continued on page 100*)

Have YOU tried the low toxicity-high flash CLEANER...?

F.O.-128

FINE ORGANICS 'SAFE-TEE' SOLVENTS

Ask your friends.
Undoubtedly many now use F. O. — 128!

NO FIRE HAZARD!
35 RAILROADS USE!

- *Safe for personnel* — 20 times safer than carbon tetrachloride!
- *Effective*, speedy cleaner!
- *Non-corrosive*. No significant residue on drying!

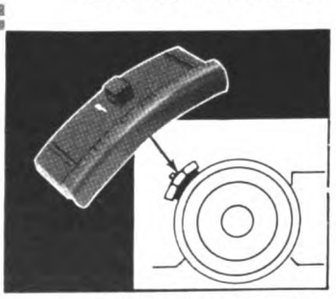
See us at the Show—
Booth 342—or write Dept. R-9
FINE ORGANICS, Inc.
211 East 19th Street, New York 3, N. Y.

For Best Wheel Maintenance

FCC FLANGE CUTTERS

—cut flange down when needed, keeps wheel in perfect operating condition. Keeps engine rolling.

ABRASIVE BRAKE SHOES



—applied in place of regular brake shoe, grinds the wheel slowly, accurately, economically. Provides more efficient driving wheel contact.

For your best wheel maintenance, whether it is a flange cutter or a wheel abrasive shoe, be sure it is a "Wheel Truing Brake Shoe", designed especially to meet your needs. Write today for full information.

WHEEL TRUING BRAKE SHOE CO.

628 W. Baltimore Ave., Detroit 2, Michigan • "Abrasive Brake Shoes since 1898"

We're coming to Chicago

to present the NEW

Superflame CABOOSE HEATER

- **53,000 BTUs. Burns No. 1 or No. 2 fuel oil.**
- **Scientifically Louvered for maximum circulation.**
- **Cooking Surface for hot meals.**
- **Famous Superflame "Fuel-Saver" — saves 1/3 on fuel.**
- **Special Metering Valve for safe, controlled operation.**

Make a point to see the new Superflame Caboose Heater — a compact, ruggedly-built heater expressly made for the railroad. Complete with cooking surface for hot meals. Has famous Superflame burner and heat chamber. Heavy-duty 6" legs anchor the unit solidly. Built throughout to withstand vibration and shock.

We'll be in
Booth 100
Allied Railway Supply Exhibit

If you can't attend, send for more information.

QUEEN STOVE WORKS, INC.
539 Front St., Albert Lea, Minnesota

Yes. We'd like to have more information about the new Superflame Caboose Heater.

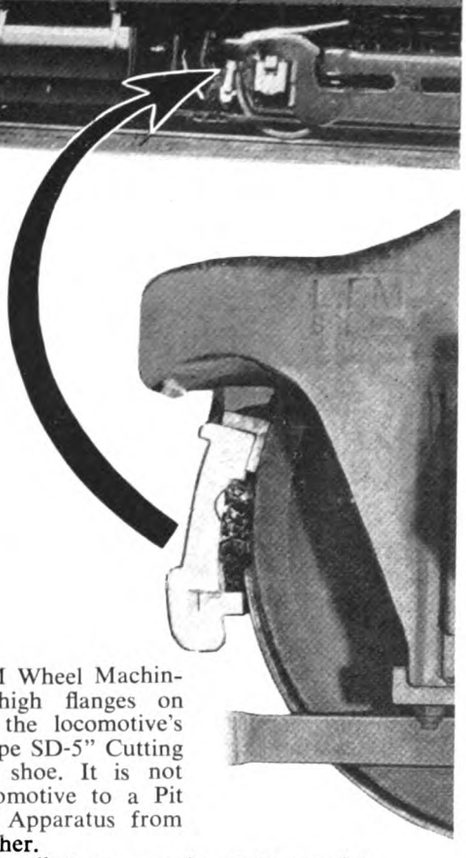
Firm _____

Address _____

By _____

Cuts High Maintenance Costs

L & M WHEEL MACHINING APPARATUS



New and improved L & M Wheel Machining Apparatus reduces high flanges on locomotive wheels using the locomotive's own power. This new "Type SD-5" Cutting Head replaces the brake shoe. It is not necessary to take the locomotive to a Pit to change the Machining Apparatus from one pair of wheels to another.

Model SD-5 is readily installed on a pair of locomotive wheels in less than fifteen minutes! After cutting, brakes can be restored to operating condition in the same amount of time.

Diesel-electric locomotives can be converted quickly to furnish slow, even power for the cutting operation with a simple electrical adjustment. On one type Diesel-locomotive in general use this is achieved by simply blocking open the main generator field contactor. This will provide an even start, and at half throttle will give the desired 1 rpm for cutting. From 15 to 30 lbs. pressure in the brake system is sufficient.

Studies show that with 2 pairs of wheels fitted with L & M Cutting Heads the average locomotive "out of service" time was less than 1-2/3 hours per pair of wheels cut.

VISIT US at BOOTH 304

Allied Railway Supply Exhibit, Hotel Sherman, Chicago, Sept. 15-18

THE DURAMETALLIC CORPORATION

24 Commerce Street, Newark, N. J.

Mitchell 2-3444-5

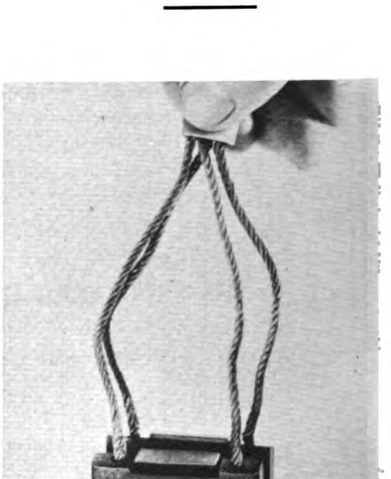
EQUIPMENT

(*Continued from page 98*)

the field. The ohm scale is used in addition to and independently of the megohm scale.

This facility for discharging capacitance removes the hazard to persons and equipment that might come in contact with charged apparatus following the test.

The charge is dissipated in a manner that does no harm to the apparatus or the Megger instrument. The discharge switch opens the circuit between the measuring portion of the instrument and the testing terminals, and short-circuits the latter through a current-limiting resistor. *James G. Biddle Company, Dept. RLC, 1316 Arch st., Philadelphia 7, Pa.*



Brushes with Shock Absorbers

A hard rubber cap laminated to a protective Neoprene pad providing a double-duty shock absorber for motor and generator brushes has been announced. The hard cap receives the initial impact of shock and vibrations transmitted from machine to brush holder. This protects the softer pad from excessive wear and compression. The pad in turn protects the brush from short life, breakage and shunt fraying. The brushes are developed especially for railroad traction motors.

The resilient layer absorbs vibration from all causes, resulting in better contact between brush and commutator. The hard top layer resists wear or indention by the spring finger, permitting free movement of the brush throughout its life. The hard top layer distributes pressure over the entire area of the resilient layer, thereby increasing its life. *Speer Carbon Company, Dept. RLC, St. Marys, Pa.*

Have YOU tried the low toxicity-high flash CLEANER...?

F.O.-128

FINE ORGANICS 'SAFE-TEE' SOLVENTS

Ask your friends.
Undoubtedly many now use F. O. — 128!

MANY DEPARTMENTS SPECIFY 'Safe-tee' SOLVENTS

- Great for *Diesel* Electrical Equipment!
- *Safe* — contains no carbon tetrachloride or other cleaning health hazards!
- Will not cause *dermatitis!*

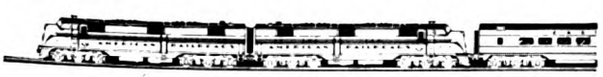
See us at the Show—
Booth 342—or write Dept. R-9
FINE ORGANICS, Inc.
211 East 19th Street, New York 3, N. Y.

America's foremost engineered lettering tools

designed to reduce your present costs
50 to 80%
Used today by 1/3rd of the Nation's leading Railroads . .

DN

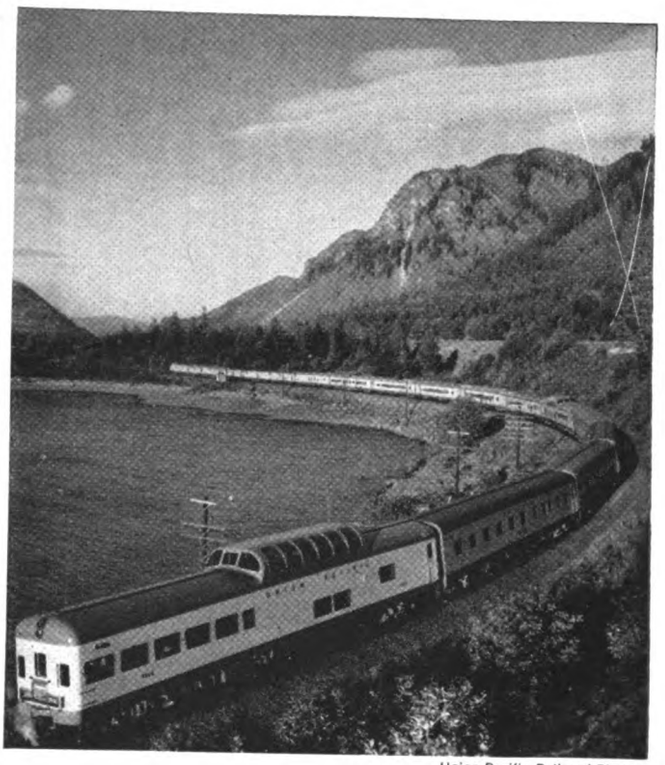
Spray it—
STENCILS
PRESSURE SENSITIVE TYPES



Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100
THE DEMP-NOCK COMPANY
21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.



Union Pacific Railroad Photo

Ex-Cell-O Pins and Bushings take high speed torture out of a million turns

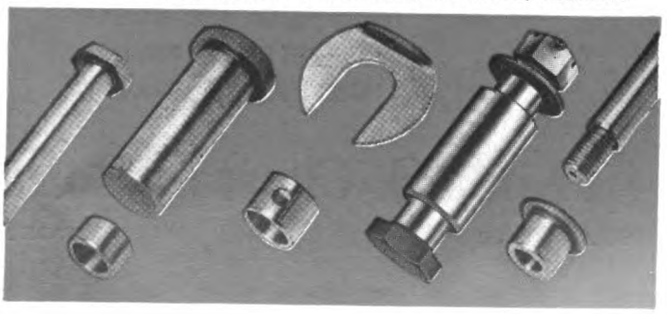
Imagine the stress and strain on the pins and bushings as these passenger cars roar around this curve in the Columbia River Gorge. Ex-Cell-O Pins and Bushings—performing for over 200 railroads—take this kind of treatment every day. Often are usable up to a million miles because of a super-fine finish and a specially heat-treated, diamond-hard steel case. Dust, strain, abrasion, weather, sudden jolts—Ex-Cell-O Pins and Bushings shrug them off over the miles.

Because of well-stocked warehouses, you get express-quick service. Railroad men like the exceptional service policy that backs up every Ex-Cell-O Pin and Bushing. Available as assemblies or separately.

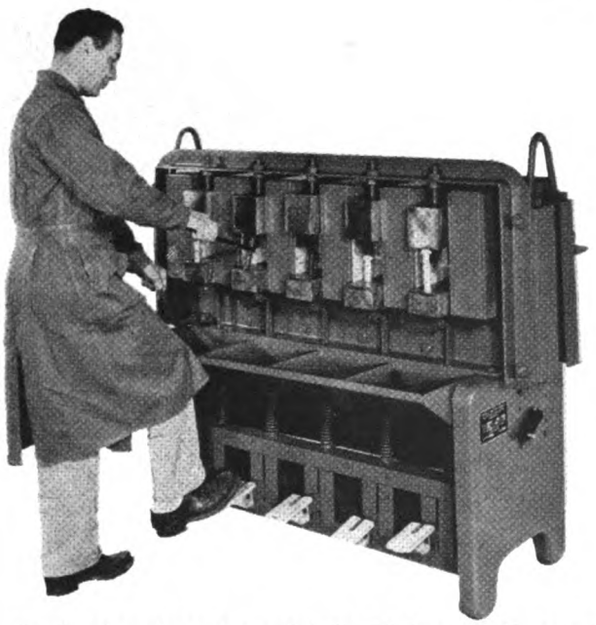
Why not contact your Ex-Cell-O Representative or Ex-Cell-O, Detroit, soon?

EX-CELL-O CORPORATION
EX-CELL-O FOR PRECISION
XLO
57-85

RAILROAD DIVISION, EX-CELL-O CORPORATION, DETROIT 32, MICHIGAN



At work on the



No. 3—five electrode model, for high production positions—the real workhorse of the trade. Other models for heating two and three rivets at a time.

THE B&O USES CHESTON ELECTRIC RIVET HEATERS AT DU BOIS

In its busy shops at DuBois, the Baltimore and Ohio Railroad uses Cheston Electric Rivet Heaters because of the great economy and convenience built into our equipment . . . and because the cool, clean, quiet and entirely modern operation of the Cheston Heater is right for an up-to-date shop, and good for B&O employees.

The Cheston Rivet Heater is ready to go to work whenever . . . and wherever . . . the job is ready, and produces heated rivets within seconds of starting up. There is no waiting time loss while rivets come up to heat . . . no pre-heating expense before the shift begins . . . no fuel waste during idle periods.

With a Cheston Rivet Heater there is no heat blast . . . blower roar . . . smoke . . . fumes . . . or grime. There is no fire hazard, as open hearths and fuel lines and stores are eliminated. No compressed air is required, so the air now lost to your blast type heaters is added to your tools for better quality work.

Operating cost of a Cheston Rivet Heater averages out to about 15 cents per 100 lbs. of rivets heated. These features have made good sense to the B&O, and to scores of other railroads, large and small.

CHESTON ELECTRIC RIVET HEATERS
MAKE THE BEST SENSE FOR YOU, TOO.
WRITE FOR DETAILS TODAY.

Frank C. Cheston Company

60 Park Place — Newark 2, New Jersey

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

SPECIAL TOOLS. Four-page Bulletin No. 70 illustrates advanced work-holding devices for use in metalworking industry. Featured are standard and special chuck jaws, expanding mandrels, gear hobbing arbors, special collets, milling machine adapters, cutoff blades and other unusually designed tools. (Write: *Sutton Tool Company*, Dept. RLC, Sturgis, Mich.)

ARMSTRONG TOOLS. 120-page general catalog includes 500 new types and sizes of wrenches, socket wrenches, drop forged clamps, tool holders, set-up and hold-down tools, cutting tools and pipe tools. (Write: *Armstrong Bros. Tool Company*, Dept. RLC, 5200 W. Armstrong ave., Chicago 30.)

END MILLS. 16-page catalog shows complete line, with prices and dimensions, of high-speed end mills. Contains also technical data section of Helpful End Mill Facts. (Write: *Chicago-Latrobe*, Dept. RLC, 411 West Ontario st., Chicago 10.)

JACKS. — 20-page catalog (1957-R) groups specifications for 145 models of Western (Buda) jacks for all trades, and briefly describes the special features of each group. (Write: *Western Railroad Supply Company*, Dept. RLC, 2428 South Ashland ave., Chicago 8.)

WELDING SUPPLIES. 8-page booklet (SB-1354) a "Weldirectory" of automatic electrodes and fluxes for submerged arc welding and hardsurfacing. Contains table showing combined properties of all weld metal deposits and a guide for flux selection by operating characteristics. (Write: *Lincoln Electric Company*, Dept. RLC, Cleveland.)

ELECTRIC PREHEATERS. 12-page pocket-size maintenance manual on Kim Hotstart electric preheaters deals with regular inspection and servicing of units and outlines a program of preventive maintenance. Contains models and sizes, parts list for standard and special units, drawings of various models, and information on replacement of elements. (Write: *Kim Hotstart Manufacturing Company*, Dept. RLC, West 917 Broadway, Spokane 1, Wash.)

SYNTHETIC LUBRICANTS. "Jet Age Lubricants," a 24-page manual, on the development, testing and application of engineered lubricants. Illustrates and

(Continued on page 104)

Have YOU tried the low toxicity-high flash CLEANER...?

F.O.-128

FINE ORGANICS 'SAFE-TEE' SOLVENTS

Ask your friends.
Undoubtedly many now use F. O.– 128!

35 ROADS USE FOR DIESEL ELECTRIC EQPT.

- *20 times safer than carbon tetrachloride!*
- No significant residue on drying!
- Does *not* attack insulations!
- Non-corrosive. *Safe!* Effective!

See us at the Show—
Booth 342—or write Dept. R-9
FINE ORGANICS, Inc.
211 East 19th Street, New York 3, N. Y.

STUCKI

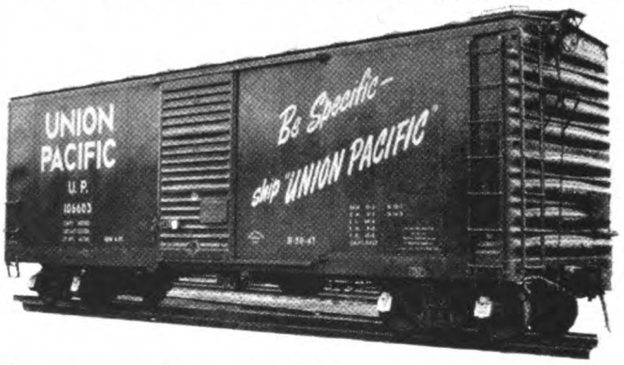
SIDE BEARINGS

FOR PROVEN DEPENDABILITY
LONG LIFE
HIGH CAPACITY
FREE SWIVELING TRUCKS
MATERIAL:
HIGH CARBON
ROLLED STEEL

A. STUCKI CO.
OLIVER BLDG.
PITTSBURGH, PA.

Take a tip from

UNION PACIFIC!



Prevent Sweat Damage to Lading with Frost's *Insulcote!*

One of the ways Union Pacific prevents damage to lading is with Frost's Insulcote . . . the modern undercoating for metal boxcar roofs.

Insulcote is an emulsion-type plastic coating that actually absorbs moisture, preventing condensation that can result in freight damage. Unlike asphaltic-type materials, Insulcote will not dissolve in mineral solvents and fumes. It adheres tenaciously to galvanized metal surfaces under any conditions.

Insulcote is safe, clean, non-inflammable. It is easy to apply with heavy-duty spray gun equipment and requires no preliminary acid treatment of the galvanized metal surface. The roof of a 40-foot boxcar can be undercoated with Insulcote in less than 15 minutes.

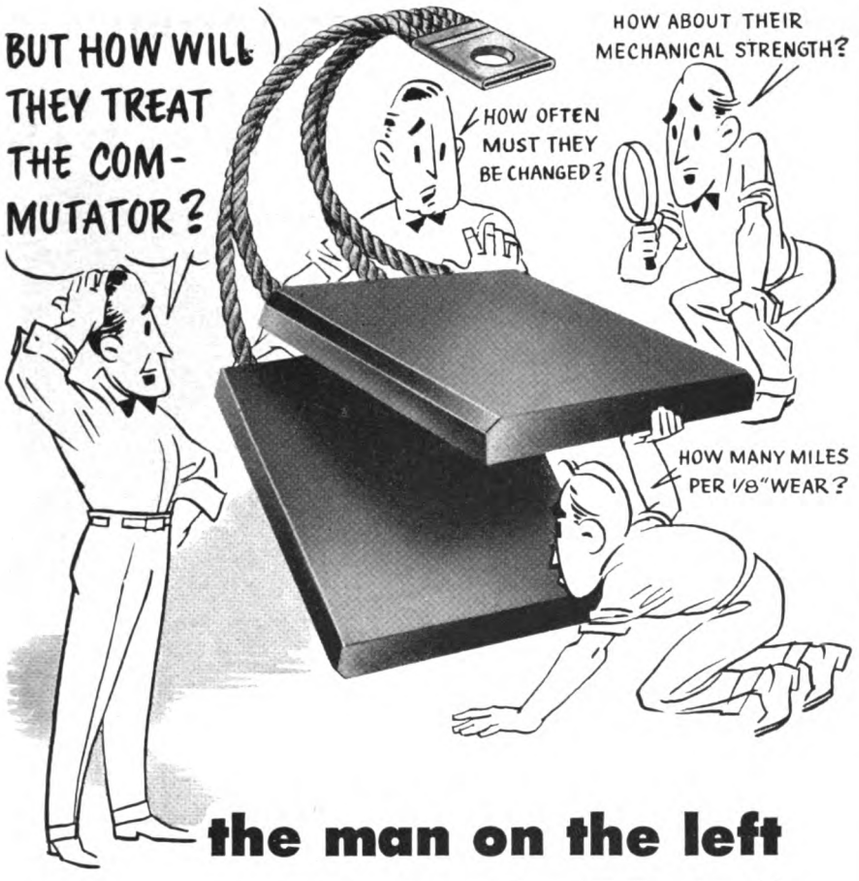
Frost's Insulcote is light tan in color to match car linings. It is available in 5-gal. steel pails and 55-gal. open-head steel drums.

***Other* FROST RAILWAY SPECIALTIES**

- **NO-RUST** Car Journal Compound
- **VERNIX** Floor Hardener
- **SURE-FOOT** Non-Slip Paint

VISIT US AT BOOTH NO. 149
ALLIED EXHIBIT • HOTEL SHERMAN, CHICAGO
SEPTEMBER 16, 17, 18

Frost PAINT & OIL CORPORATION
1209 N.E. TYLER
MINNEAPOLIS 13, MINNESOTA



the man on the left is R-I-G-H-T!

Any way you look at diesel-electric brushes this conclusion must invariably be reached . . .

The best, most economical grades for any given equipment are those that keep the commutators in the best condition under all operating conditions and over the longest mileage schedules.

Brush life is important, too . . . but, in the Stackpole "book", commutators and commutation come first . . . and for primary economic reasons.

Motor brushes, for instance, cost only about $12 a set.

Conservatively estimated, reconditioning a motor commutator costs around $400 . . . and perhaps more if it has been badly bar burned by brushes that had only long life to recommend them.

STACKPOLE

***Diesel Electric* BRUSHES**

STACKPOLE CARBON COMPANY, *ST. MARYS, PA.*

BRUSHES for all rotating electrical equipment • ELECTRICAL CONTACTS • CATHODIC PROTECTION ANODES • CHEMICAL ANODES • VOLTAGE REGULATOR DISCS • BEARINGS • WELDING CARBONS • MOLDS & DIES • SEAL RINGS • FRICTION SEGMENTS • ELECTRIC FURNACE HEATING ELEMENTS • CLUTCH RINGS • and other carbon, graphite, metal powder specialties.

HELPS FROM MANUFACTURERS

(*Continued from page 102*)

describes in detail testing operations conducted at Lehigh laboratory, with charts and graphs demonstrating physical properties of Anderol lubricants in comparison with petroleum lubricants—volatility, oxidation stability, evaporation, etc. (Write: *Industrial Service Department, Lehigh Chemical Company,* Dept. RLC, Chestertown, Md.)

DELIVERY SYSTEM FOR BULK GASES. 16-page pamphlet (Form ADC 663A) discusses bulk delivery method of handling industrial gases in large quantities. Illustrates types of delivery units and explains advantages of each. Shows plans for trailer unit parking and indicates yard space required. Contains also unit specifications and related information on control equipment, measurement of gas consumption, and distribution pipelines. (Write: *Air Reduction Sales Company, a Division of Air Reduction Company,* Dept. RLC, 150 East 42nd st., New York 17).

CORROSION CONTROL. 4-page folder on "Kel-F" dispersion coating system describes advantages of halofluorocarbon coatings for industrial corrosion control and contamination prevention. (Write: *Minnesota Mining & Manufacturing Co.,* Dept. RLC, 900 Bush st., St. Paul 6, Minn.)

SILICONE RUBBER. 6-page folder describes physical properties of Silastic silicone rubber for use wherever heat, cold, compression, oils, fuels, chemicals, moisture, etc., are a problem (Write: *Dow Corning Corporation,* Dept. RLC, Midland, Mich.)

JOURNAL STOPS. 20-page booklet, "Magnus R-S Journal Stops," contains design and performance data, drawings and statistics. Covers all installations on freight cars to May 15 of this year. (Write: *Magnus Metal Corporation,* Dept. RLC, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 4.)

RUST REMOVER. 4-page folder describes Turco alkaline rust, a chemical compound which is said to remove rust, paint and primer from metal surfaces in two simple steps without the use of acids. (Write: *Turco Products, Inc.,* Dept. RLC, 6135 South Central ave., Los Angeles 1, Calif.)

ELECTRICAL CONDUCTOR CODE NAMES.—38-in. by 29-in. wall chart, printed on washable, crack resistent plastic paper, lists past and present code names for aluminum electrical conductor. General section alphabetizes more than 600 code names and specifies type and size of products. Data on coverings, messengers, sizes and strandings tabulated. Both British and United States standard tables included. (Write: *Kaiser Aluminum & Chemical Sales, Inc.,* Dept. RLC, 919 North Michigan ave., Chicago 11.)

Have YOU tried the low toxicity-high flash CLEANER...?

F.O.-128

FINE ORGANICS 'SAFE-TEE' SOLVENTS

Ask your friends.
Undoubtedly many now use F. O. — 128!

PERFECT FOR FAST CLEANING OF RELAYS!

- *Minimum time needed!*
- *20 times safer than carbon tetrachloride!*
- *Requires little supervision!*
- *Low, low cost!*

See us at the Show—
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FINE ORGANICS, Inc.
211 East 19th Street, New York 3, N. Y.

F.O.

Brush up on your Spanish sales!

Read all about the big demand for U. S. rail supplies in Latin America? Then get acquainted with *Selecciones del Railway Age*—Spanish-talking sister publication of *RL&C* and *Railway Age*. With Latins buying U. S. equipment by the millions (67.5 millions last year) for a modern rail system—*Selecciones* is the newest and hottest place to lecture these senors on the best in locomotives and cars. In fact a well-spoken ad here is the only practical way to get the story of your product through the language barrier—over the border to a giant new railway world.

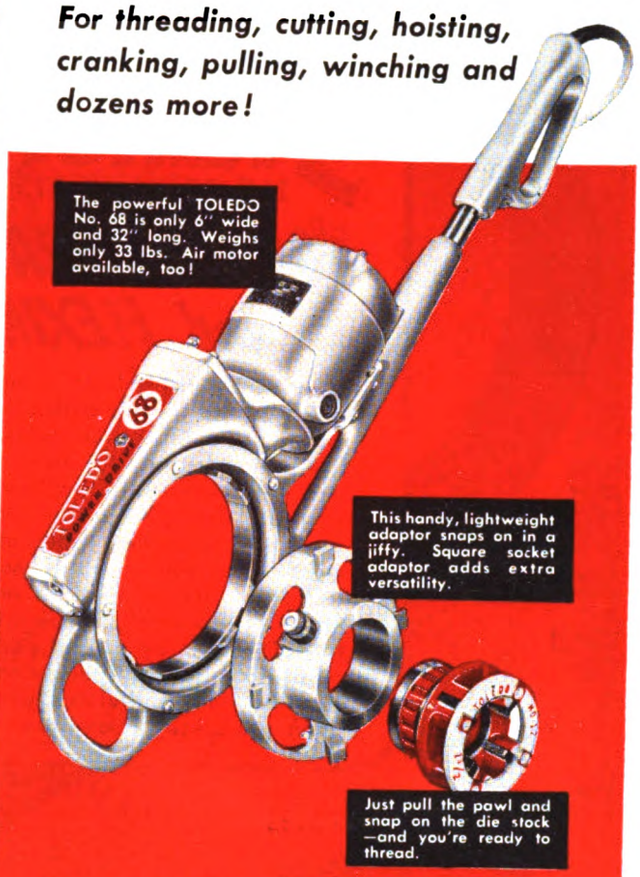
Don't depend on a Spanish-spouting salesman—he couldn't reach all the buying bases. Say it in *Selecciones*. It's the smart way to say sales in Latin America.

SELECCIONES
del Railway Age

30 Church St. **New York 7, N. Y.**

TURNING POWER

For threading, cutting, hoisting, cranking, pulling, winching and dozens more!



TOLEDO No. 68 Power Drive will be the busiest—and the handiest—tool you ever owned. It's a rugged, lightweight workhorse, a husky worm and ring gear assembly powered by a ½ HP reversible motor, housed in a gleaming lightweight frame. With adaptors, the No. 68 makes a handy threader for pipe or conduit—handles die stocks up to 4". Die heads change in seconds. The No. 68 is only 6" wide—gets to work in cramped quarters. WHEREVER you need portable turning power the TOLEDO No. 68 is the answer.

This square socket adaptor puts real turning power on the spot . . . opening and closing valves . . . operating hoists and winches . . . operating tapping machines . . . turning earth augers . . . pulling wire through long conduits . . . bending pipe . . . and you'll find many, many more when you put a TOLEDO No. 68 to work for you! See your nearby TOLEDO distributor today!

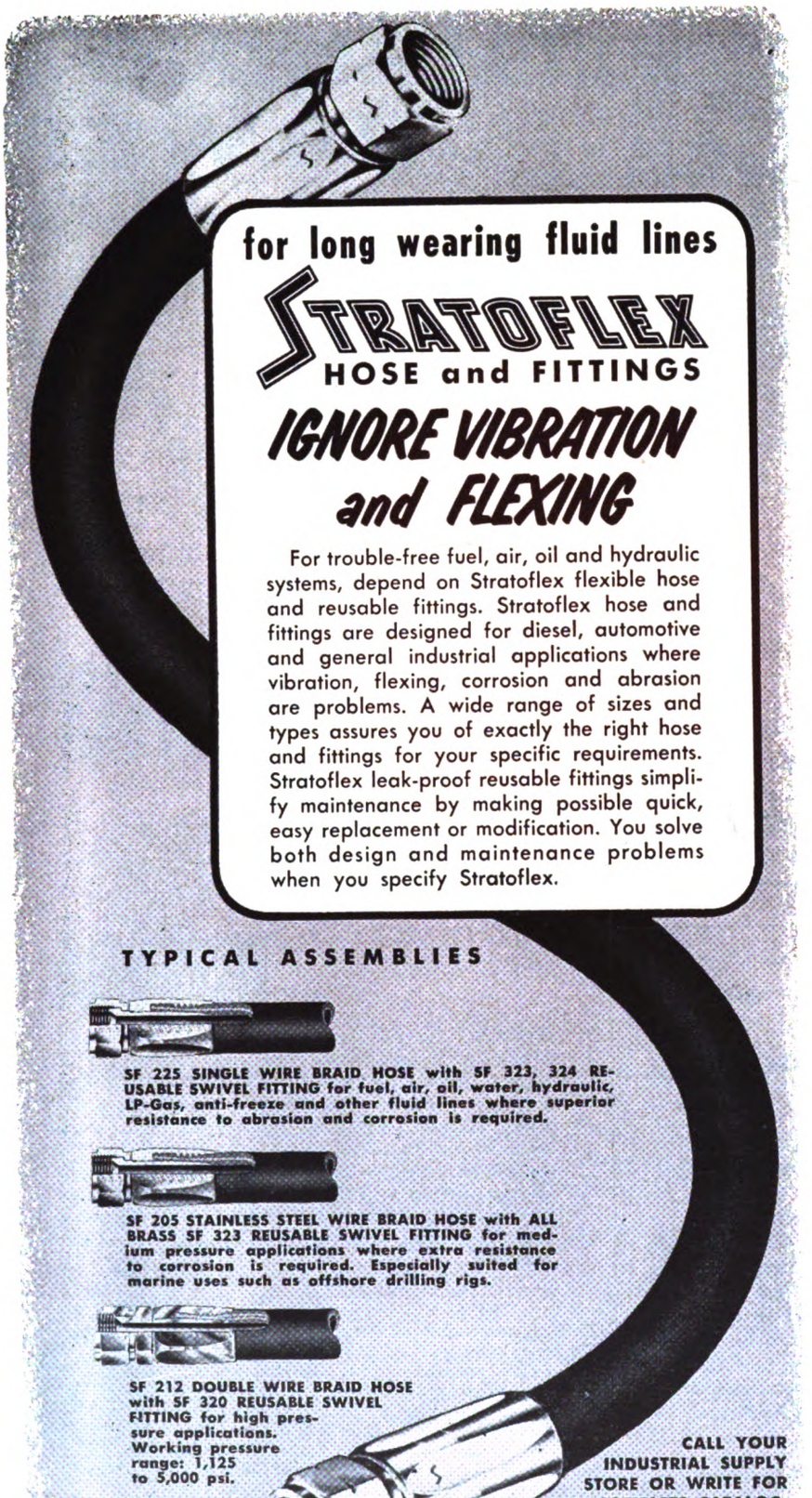
Quality Checked

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO®

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

THE TOLEDO PIPE THREADING MACHINE CO., TOLEDO 4, OHIO



PERSONAL MENTION

(*Continued from page 14*)

sion master mechanic at Winnipeg, appointed assistant engineer of motive power.

L. B. George

C. W. Parker

W. D. Dickie

L. B. GEORGE appointed chief of motive power and rolling stock at Montreal as announced in the August issue. *Career*: Entered CPR service as a shop messenger at Vancouver in 1910. After World War I, in 1919, resumed training as a machinist apprentice at Vancouver. Subsequently locomotive foreman; shop foreman; assistant foreman, motive power, at Winnipeg; general locomotive foreman at Vancouver; and division master mechanic at Letbridge. During World War II engaged in special aircraft work. Became works manager of CPR at Weston shops, Winnipeg, in March 1942; assistant superintendent of motive power, western lines, in 1946, and assistant chief of motive power for the system on January 1, 1948.

W. D. DICKIE appointed assistant chief of motive power and rolling stock as announced in the August issue. *Career*: Apprentice at Glen Yard, Montreal; machinist apprentice at Winnipeg; chief draftsman; general locomotive foreman at Moose Jaw; division master mechanic at Calgary; supervisor of machinery; general supervisory of machinery, motive power department, at Montreal, and assistant works manager (locomotive) Angus shops.

C. W. PARKER appointed chief mechanical engineer as announced in August. *Career*: Worked as a machinist apprentice while attending University of British Columbia at Vancouver, from which he was a graduate in mechanical engineering in 1941. Later engaged on

(*Continued on page 108*)

PROVED!
DEPENDABLE TRACTION MOTOR GEAR LUBRICATION FOR OVER 6 MONTHS WITHOUT GREASE ADDITION!
NEW ESSO ARAPEN GEAR LUBRICANT

Extensive 18 month on-the-road tests by the New York Central Railroad have *proved* that Esso Standard's new Arapen Gear Lubricant gives completely dependable traction motor gear lubrication for well over six months. During the six-month periods *no* additional lubricant was required. Arapen outlasted the previously used lubricant by at least 6 to 1!

NEW YORK CENTRAL SYSTEM

New Esso Arapen Gear Lubricant is another exclusive development of Esso Research. For further information and technical assistance in the use of Arapen Gear Lubricant, call your local Esso office, or write: Esso Standard Oil Company, Railroad Sales Division, 15 W. 51st Street, New York 19, N. Y.

ARAPEN Reg. U. S. Pat. Off.

Performance advantages of **ARAPEN GEAR LUBRICANT:**

Reduced Leakage: maintains consistency through full range of operating temperatures, minimizing drippage on ties, pits and station platforms.

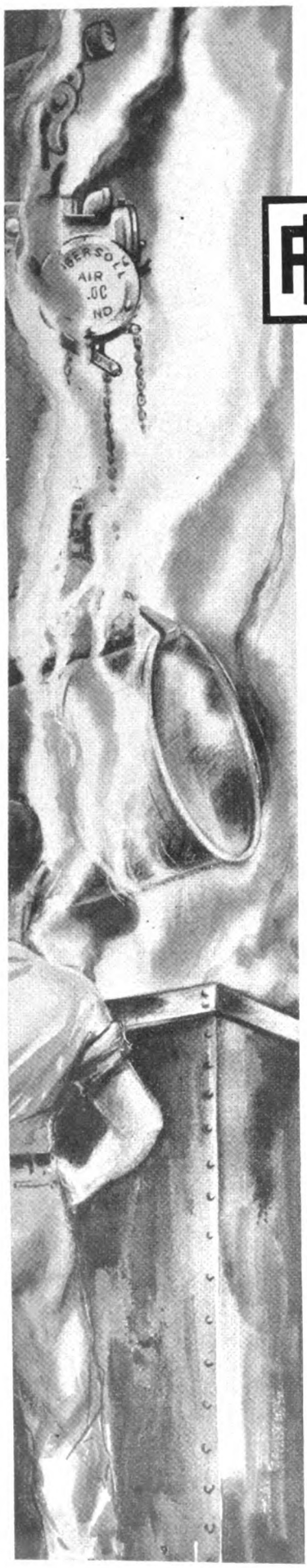
Improved Oxidation Stability: permits extended operation without hardening.

Excellent Structure Stability: reduces failures due to dry gears caused by excessive gear case leakage.

Better Anti-Wear Characteristics: high grease retention assures proper gear protection for prolonged time.

Esso

RAILROAD PRODUCTS



in steam and vapor
300 LIFTS per hour
for 12 years

overhead air hoists set new performance records

Since 1945 two Ingersoll-Rand Overhead Air Hoists have been continuously used by a firm in cleaning 55 gal. drums. These drums are slung beneath the hoists and lowered into a cleaning bath consisting of hot water and strong wetting and cleaning agents. As a result, clouds of steam and vapor practically obscure the hoists at all times. And except for minor repairs and standard maintenance, these hoists have never stopped.

Dependability and rugged construction are just two of the reasons why more and more plant men are specifying Ingersoll-Rand Air Hoists. These other important advantages contribute to long life and easier, safer operation:

Automatic Brake—holds the load automatically

Automatic Safety Up-Stop—shuts off air, stops motor before load reaches hoist

Graduated Reversing Valve—instant and complete control of hoisting action

Poppet Throttle Valve—prevents air leakage when hoist is idle

Pendent Throttle—The only complete line of air hoists with convenient "one hand" control.

Ingersoll-Rand Overhead Air Hoists are available in many types and sizes. Capacities range from 200 lbs. to 24,000 lbs. Your I-R AIRengineer can point out how these air hoists can give you new hoisting economy. Call him today, or write direct for catalog data.

8-530

Ingersoll-Rand
11 Broadway, New York 4, N. Y.

PERSONAL MENTION

(*Continued from page 106*)

technical studies in research department, and in 1951 became special engineer, motive-power department.

Central of Georgia.—EUGENE T. HARRISON, JR., assistant diesel superintendent, Macon, Ga., appointed master mechanic, Columbus division. C. H. CARROLL, general diesel supervisor, appointed supervisor diesel locomotive maintenance, *Macon;* W. H. LEAVENGOOD, mechanical engineer, appointed assistant master mechanic — system, *Macon;* W. B. GRIMES, electrical engineer, appointed equipment engineer, *Savannah, Ga.*

Chicago & Northwestern.—JOHN CABLK appointed assistant diesel supervisor, *Chicago.*

Chicago, Burlington & Quincy.—*Chicago:* R. E. TAYLOR, mechanical engineer, appointed engineer equipment (design and maintenance). D. V. HON, superintendent car department, appointed assistant engineer equipment(design and maintenance). WILLIAM BAUER, general car inspector of lines east of Missouri river, appointed assistant engineer equipment (design and maintenance). J. J. MATHIEU, mechanical inspector, appointed general car inspector of lines east.

Denver & Rio Grande Western.—*Burnham shops, Denver, Colo.*: R. L. AGES appointed diesel instructor; D. W. MATSCHKE, machine and erecting shop foreman; R. A. MCCURDY, diesel shop foreman; R. E. ELSTON, diesel maintenance supervisor and T. J. ORR, assistant electrical foreman.

Elgin, Joliet & Eastern.—HAROLD W. HARTSHORNE appointed assistant to the chief mechanical officer, *Joliet.* CHESTER LESNIEWSKI, car inspector, appointed car foreman, *South Chicago.*

Great Northern.—*St. Paul*: DONALD F. MARSTON appointed mechanical assistant. Formerly assistant master mechanic at Spokane, Wash. *Wenatchee, Wash.*: JOSEPH F. N. GAYNOR, superintendent of electrical operations, appointed assistant master mechanic.

Louisville & Nashville.—*Louisville, Ky.*: W. C. SEXTON appointed to newly created position of planning-production engineer. F. L. PEAK appointed engineer of planning.

New York Central.—*New York*: F. J. KUSSUTH appointed assistant general mechanical superintendent—car. A. F. HAGY succeeds Mr. Kossuth as supervisor car maintenance. V. F. KANIA succeeds Mr. Hagy as assistant supervisor car maintenance, and D. A. SWANSON succeeds Mr. Kania as general inspector. J. A. MACKINNON, JR., appointed assistant general inspector, and J. P. HAMM, assistant industrial engineer. *Harmon, N. Y.*: F. L. HOFFMAN, master mechanic, ap-

pointed general superintendent of diesel-electric shop.

Norfolk & Portsmouth Joint Car Inspector Association.—C. O. KEAGY, chief joint inspector, retired.

Southern.—*Spencer, N. C.*: CECIL D. SCHWINE, JR., appointed superintendent motive power. MANLEY H. HAMMETT, master mechanic, succeeds Mr. Schwine as manager, Spencer shop. PAUL T. HOSKINS, general foreman at Chattanooga, Tenn., succeeds Mr. Hammett. *Columbia, S. C.*: LAWRENCE S. PRESSON, JR., appointed master mechanic. Formerly general foreman car department-passenger, Hayne shop, Spartanburg, S. C.

Obituary

L. S. KURFESS, assistant superintendent car department, Erie, died July 30.

Supply Trade Notes

OLIN MATHIESON CHEMICAL CORPORATION.—*Sam Gurley, Jr.,* has been appointed vice-president of sales for Olin Aluminum.

■

DODGE MANUFACTURING CORPORATION.—*Paul Jordan,* plant engineer, has been appointed director of engineering.

■

DAYTON RUBBER COMPANY.—*George S. Smith* has been appointed sales engineer, Railway Division, covering the Minneapolis territory.

■

DOLPHIN PAINT & VARNISH CO.—*G. Gilbert Thorne* has been appointed sales manager at Toledo, Ohio, succeeding Marion Winkle who will continue with the company as a consultant and for special projects.

■

FARR COMPANY.—A two-story glass and red brick structure has been completed at El Segundo, Calif., at a cost of $250,000, adding 28,000 sq. ft for manufacturing and engineering facilities for Far-Air filters and other types of air filtration equipment.

■

DANA CORPORATION.—*Ray Reed,* assistant chief mechanical transmission engineer, has been appointed chief engineer of the railroad division.

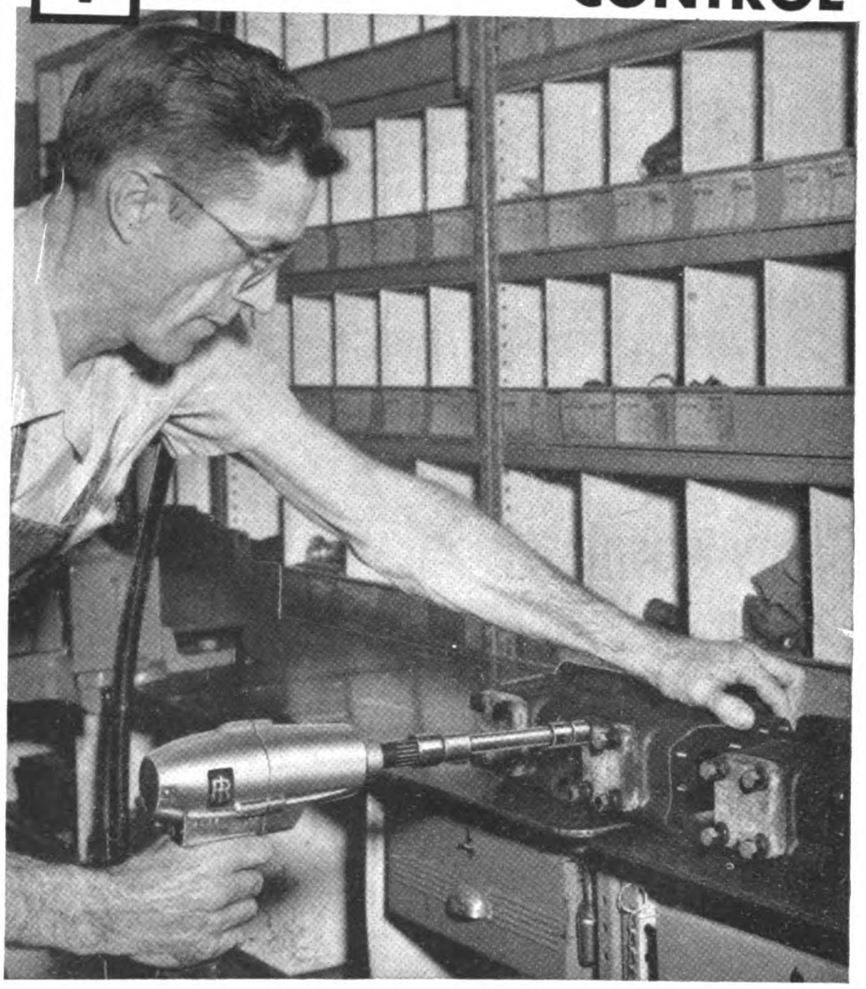
■

THOR POWER TOOL COMPANY.—*William J. McGraw,* manager New York City branch office, has been appointed manager of the Thor electric tool sales division, with head-quarters in Chicago.

■

BRANDON EQUIPMENT COMPANY, INC. Brandon Equipment will take over sale of equipment developed by R. E. Russell & Co. of Hughesville, Pa., for railroad flat cars used in piggyback service. *Col. R. E. Russell,* who has

IR TORSION BAR TORQUE CONTROL



TORQUE CONTROL IMPACTOOLS meet torque specifications 100%

Quality Control Improved on 12 Jobs in 3 Departments

1. **Cable control assemblies:** 5 operations involving torques from 14 to 75 ft. lbs.
2. **Scraper Assembly:** 6 line jobs using Impactools set for 40, 60, 75 and 80 ft. lbs. torques.
3. **Hydraulic control assembly:** 1 job running ½" cap screws to 65 ft. lbs. torque.

Production checks made by this manufacturer of road building equipment show that new Ingersoll-Rand Torsion-Bar Torque Control Impactools run every nut and cap screw within torque specifications.

With the standard impact wrenches previously used, the operators attempted to control torque by length of time the tool impacted. The new Torque Control Impactools shut off instantly and automatically when the pre-set torque is reached. This simplifies operator training and improves worker morale.

The end result is dependable product performance in the field. This same kind of cost-saving performance can be put to work for your company now. Write for Bulletin 5170.

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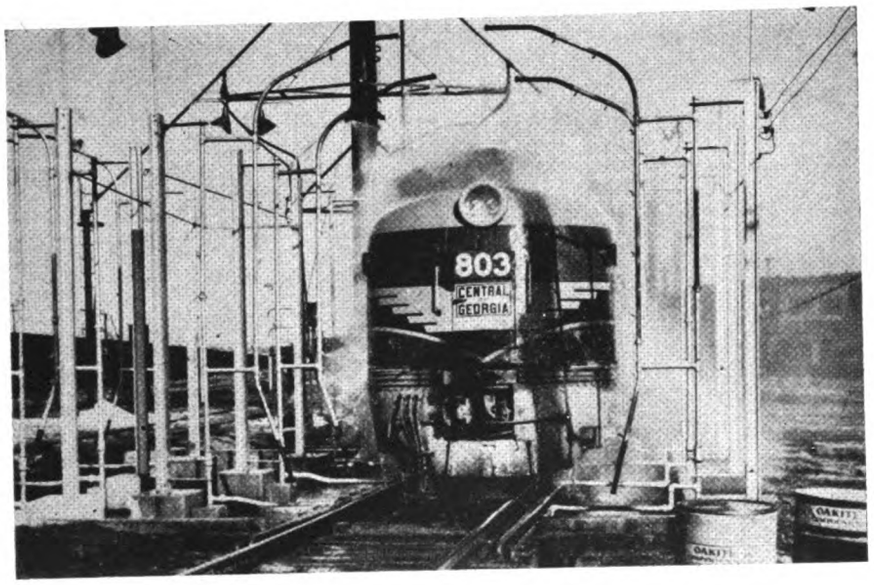

Spray washing originated by Oakite contributes to low-cost end results

Cleaning by the best methods and with quality materials costs less in the end every time.

In washing diesel units and passenger car surfaces and running gear, that means a material such as Oakite Compound No. 88 and pressure-spray cleaning and rinsing—the basic system which *Oakite pioneered over 10 years ago* and which has since become standard practice.

While a variety of these systems is now available, Oakite supplies blueprints and specifications to permit "custom" fabrication of spray equipment in railroads' own shops.

To make sure *your* pressure washing of equipment ends up at lowest possible cost, take advantage of the safety, efficiency, and streak-free results provided by Oakite cleaning compounds. So many leading roads already are. For more information, drawings or data write OAKITE PRODUCTS, INC., 46 Rector Street, N. Y. 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

. . . gives you the important advantage
LOW-COST END RESULTS

Export Division Cable Address: Oakite

RAILROAD DIVISION

headed the Russell company, will have charge of Brandon sales in the eastern region for the combined line of products.

■

CANADIAN CAR COMPANY, LTD.—Can-Car has acquired all the railway equipment business formerly carried on by the Standard Railway Equipment Manufacturing Company at Lachine, Que. Manufacture of railway equipment will continue at Lachine until Can-Car facilities are completed at its Dominion plant in about a year.

■

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—*William E. Glasby* has joined Simmons-Boardman as district manager at Philadelphia. Mr. Glasby attended Lehigh University and Franklin & Marshall College, graduating from the latter with a B.S. in economics. Following 15 years in engineering and sales with American Lava Corporation, a subsidiary of Minnesota Minning & Manufacturing, he was associated with the Western Railroad Supply Company, Chicago, as advertising manager. Mr. Glasby is a native of New Jersey. *Harry M. Blunt* has joined Simmons-Boardman as district representative at Cleveland, Ohio. Mr. Blunt, a native of Ohio, entered railroad service with the Erie in the superintendent's office at Youngstown in 1923, joined the Pennsylvania in 1926, and served in the freight traffic department of that road until his recent appointment with Railway Locomotives and Cars and its allied railway publications.

■

AMERICAN BRAKE SHOE COMPANY, NATIONAL BEARING DIVISION.—*Albert L. Hunt*, general manager at St. Louis, has been appointed a vice-president in charge of manufacturing operations for plants in St. Louis, Meadville, Pa., and Clearing, Chicago. *Paul J. Bauman*, general manager in Meadville, Pa., has been appointed a vice-president in charge of industrial sales. Mr. Bauman is located in Pittsburgh.

■

BLACK & DECKER MANUFACTURING CO.—A factory service and sales branch has been opened at 33 Webster Street, Hartford, Conn., in charge of John T. Tierney, branch service manager.

(*Turn to page 112*)

FOR SALE

New General Electric Traction Generators

Manufactured 1955 and 1956—
Never installed—With Exciters

7 Model GT-591-A 1200 HP
15 Model GT-590-A1 1600 HP

— wire or phone collect —

C. Kirk Hillman Co., Inc.
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LOCOMOTIVE AND CAR JACK

Lifts Capacity Loads Easier

25-35 and 50 Ton Models

Looks funny, doesn't it? A woman's hand on a big, rugged jack . . . but this is one way of dramatizing how much easier it is to lift capacity loads with WESTERN LOCOMOTIVE AND CAR JACKS, *the first to be equipped* with Timken roller thrust bearings. All the old, reliable standby features that have made WESTERN jacks a top favorite are still there: the "Postop" that prevents ram from being raised beyond the safe limit; free acting screw movement and the "just right" pitch of the threads for maximum lift and smooth action.

Easier lifting of capacity loads is an extra bonus *only* WESTERN can offer because *only* WESTERN equips these jacks with Timken roller thrust bearings.

Tapered Roller TIMKEN BEARING EQUIPPED

Write for Bulletin No. 1957

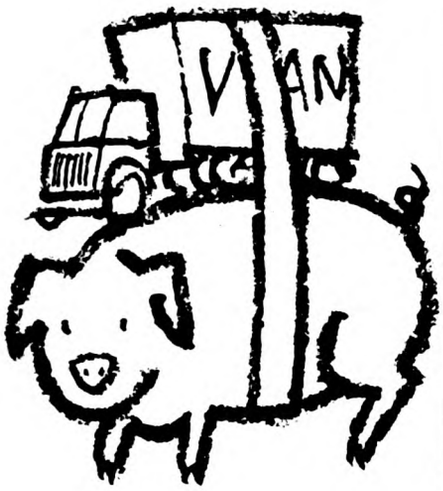
8061

WESTERN RAILROAD SUPPLY COMPANY

Division of Western Industries, Inc.

2400-2434 S. Ashland Avenue • Chicago 8, Illinois

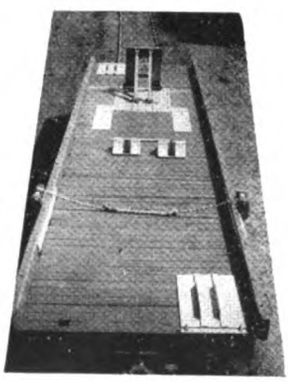
CANADA: Melville Machinery Co., Ltd., 515 Bisson St., Montreal 3, Quebec



This Truck goes to Market

PIGGY BACK

Now Paxton-Mitchell's Piggy Back Pac holds down all makes of trailers without special attachments. Universal hitch, built-in shock absorber, adjustable chain fastenings makes this the easiest, fastest operating unit available. Folds flush when knocked down.



PIGGY-BACK PAC

on display at Boths 49-52
at the Chicago Convention

Another important product ● for the railroad industry from

PAXTON-MITCHELL Company

Dept. RL
27th & Martha Sts. • Omaha, Nebraska

J. P. Kelly

N. Fesmire

H. R. Rowland

W. M. Schleicher

SUPPLY TRADE NOTES

(*Continued from page 110*)

GOULD - NATIONAL BATTERIES. INC.—*John P. Kelly,* Detroit regional manager, has been appointed general sales manager of the Industrial Division, with headquarters in Trenton, N.J.

■

JAMES G. BIDDLE COMPANY.—*Philip E. Sellers* has been appointed sales manager at Philadelphia.

■

ALCO PRODUCTS, INC.—Extensive modernization and rearrangement under way at the Schenectady, N. Y., locomotive plant is scheduled for completion in December at a cost exceeding $1,000,000. The program calls for the modernization of the present general welding shop, sub-assembly and truck shop, and miscellaneous machine shop. Subsequent rearrangement work, to complete the integration of locomotive production into the "west side" plant area, will be accomplished in the future. The facilities will replace the present locomotive erection shop on the east side of the plant.

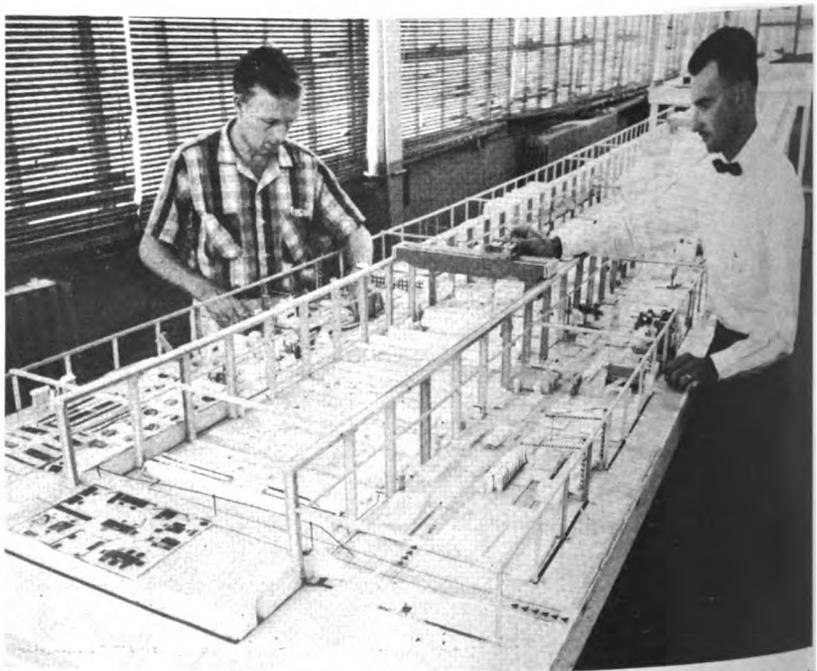
C & D BATTERIES, INC.—*Wallace M. Schleicher,* formerly general sales manager for Edison Storage Battery Division of Thomas A. Edison Industries, has been named manager, motive power and railroad sales, for C & D Batteries, Inc. *Harrison Taylor* has joined the headquarters service division, engineering department, of C & D, having formerly been with the Electric Storage Battery Company as staff engineer. *Lu Ray Staff* has joined the Buffalo, N.Y., office.

■

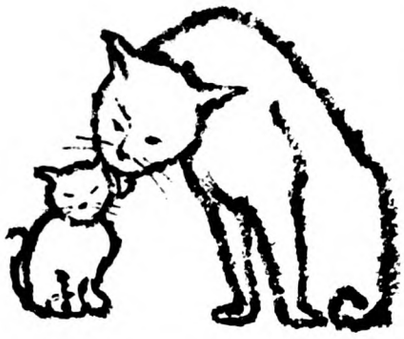
A. M. BYERS COMPANY.—*Harry R. Rowland,* general manager of sales has been elected vice-president of wrought-iron sales. *Richard I. Enzian,* manager of the Washington, D. C., division, has been appointed manager of wrought iron sales, at Pittsburgh. *Chester W. Leschenko* has been assigned as a field service engineer to the Pacific coast division.

■

BUDD COMPANY.—*Norman Fesmire,* who has held various engineering posts with Budd since 1942, has been appointed executive engineer of the Railway division.

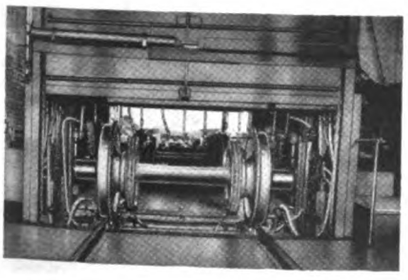


Scale model of Alco's projected new progressive-station locomotive assembly building at Schenectady, N.Y. In the foreground is the area where underframes and side trusses will be fabricated before moving to the assembly area in the opposite half of the building.



THOROUGH but Gentle

Pressurized chemical cleaners and live steam whisk away dirt and grime in the Paxton-Mitchell Wheel and Bearing Washer. Yet there's no need to mask machine parts with this gentle, thorough cleaning. Journal boxes and bearings cleaned in this same unit.



Wheel and Bearing WASHER

Tours arranged at Booths 49-52

Another important product for the railroad industry from

PAXTON-MITCHELL Company

Dept. RL

27th & Martha Sts. • Omaha, Nebraska

R. H. Waite

H. H. Rogge

ACF INDUSTRIES, AMERICAN CAR & FOUNDRY DIVISION.—*Herbert H. Rogge*, executive vice-president, has succeeded *Samuel M. Felton* as president. Mr. Felton will continue with the company as an advisor.

■

A. M. BYERS COMPANY—NATIONAL ELECTRIC PRODUCTS CORPORATION.—National Electric has been given exclusive finishing and marketing rights to the A. M. Byers Company's Underwriters' Laboratories approved wrought-iron electrical conduit.

■

MACLEAN FOGG LOCK NUT COMPANY.—*Robert H. Waite*, who has been in railroad sales for MacLean Fogg Lock Nut since 1951, has been appointed railroad sales manager.

■

BUCKEYE STEEL CASTINGS COMPANY.—*John R. Codner* has been appointed sales representative in the eastern district, New York.

■

FAIRBANKS, MORSE & CO.—the following have been reassigned: *Robert H. Morse, III*, from vice-president, sales, to vice-president, budgets and planning; *V. H. Peterson*, from vice-president, engineering, to vice-president, sales; *John A. Cuneo*, from vice-president and assistant to president to vice-president, foreign operations. *John C. Elmburg*, assistant general sales manager, promoted to general sales manager, and *G. R. Anderson, Sr.*, manager of the Kansas City, Kan., works, appointed chief engineer. *C. E. Clausen*, manager of the St. Johnsbury, Vt., works, named to succeed Mr. Anderson. Mr. Clausen's successor is *H. M. Goodchild*, chief engineer at St. Johnsbury, who in turn is replaced by *G. R. Anderson, Jr.*

■

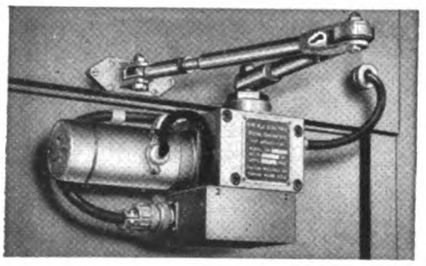
GRIFFIN WHEEL COMPANY — Griffin will build a plant for the manufacture of cast steel railroad wheels at Muncie, Kan. The new operation, scheduled for completion in the fall of 1958, will have a capacity of 120,000 wheels a year.

OBITUARY

EDWARD H. WANNEMACHER, who recently retired as vice-president in charge of sales of the James G. Biddle Company, died on July 3.

FEATHER TOUCH

At the slightest touch the Paxton-Mitchell Door Operator opens doors and automatically closes them again. This all-electric operator, available for all types of vestibule doors gives passengers and personnel the convenience of "touch and go" operation.



ALL-ELECTRIC Door Operator

on display at Boths 49-52 at the Chicago Convention

Another important product for the railroad industry from

PAXTON-MITCHELL Company

Dept. RL

27th & Martha Sts. • Omaha, Nebraska

Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

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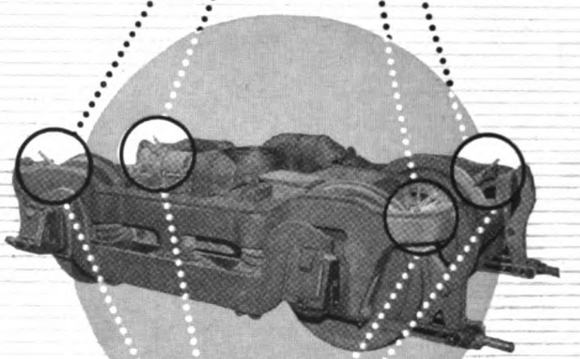
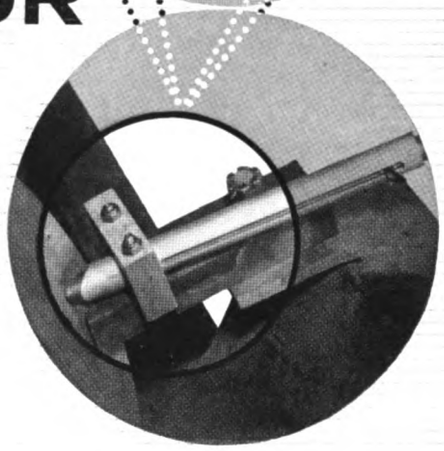
LOCOMOTIVE WHEEL LIFE

30% TO 300%!





WITH Nalco TYPE TA

FLANGE LUBRICATOR

USING Nalco **"MOLY"** STICKS

Nalco "Moly" Stick is a highly-efficient *dry* lubricant that maintains a lubricating surface between locomotive wheel flanges and track under extremes of pressure and temperature . . . without *picking up dirt and sand to form a grinding compound.* In new Nalco Type TA Lubricators, "Moly" Sticks provide automatic flange lubrication that has extended wheel life from a substantial 30% to as much—particularly on yard locomotives—as a whopping 300%!

Cost of Nalco Type TA Lubricators and "Moly" Sticks is small. Maintenance is limited to occasional stick replacements. Complete installation of lubricators on a diesel unit can be done by your shop personnel in four hours or less.

Call or write for details on the simplicity and continuing economy of Nalco Flange Lubrication for your locomotives.

NATIONAL ALUMINATE CORPORATION

6 West 66th Place Chicago 38, Illinois

POrtsmouth 7-7240

CANADA: Alchem Limited, Burlington, Ontario ITALY: Nalco Italiana, S.p.A.

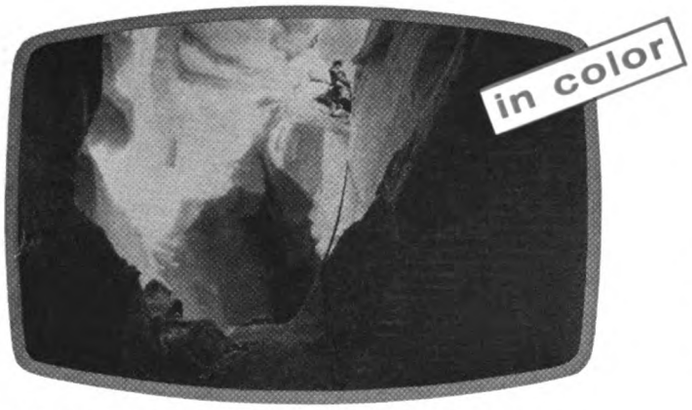
WEST GERMANY: Deutsche Nalco-Chemie GmbH

SPAIN: Nalco Espanola, S.A.

Nalco® **PRODUCTS . . . SERVING RAILROADS THROUGH PRACTICAL APPLIED SCIENCE**

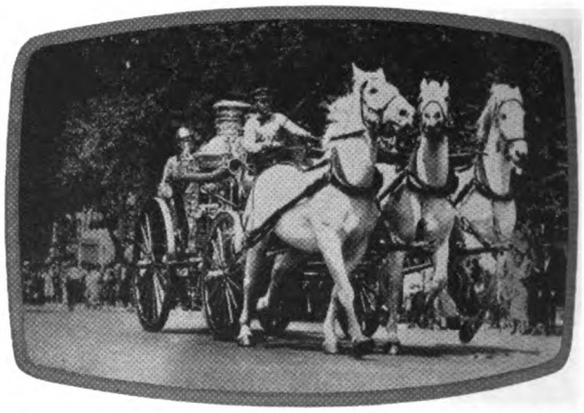
SEE TIMKEN TELEVENTS ON NETWORK TV

Two big hour-long spectaculars this fall



Over 126 NBC STATIONS, SEPTEMBER 23rd

"Eleven Against the Ice", the story of the Antarctica Turnpike. See men and machines build a trail across Antarctica's frozen wastes—in spite of 200 mph winds, temperatures of 120 degrees below zero and crevasses big enough to swallow a 20-story building. It's a triumph of engineering and human courage, a whale of a television show.

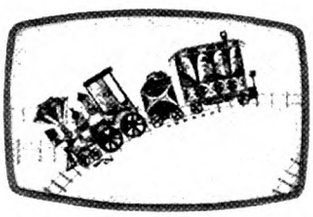


Over 142 NBC STATIONS, NOVEMBER 21st

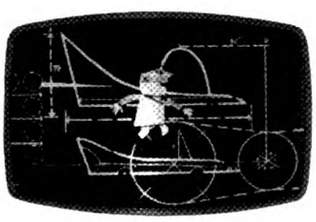
"The Innocent Years". Recaptured from exciting old films and newsreels, you'll see happy days relived. Experience the excitement of "Teddy" Roosevelt, Thomas Edison and Mark Twain in action. Hear songs like: "In the Good Old Summertime", "He'd Have to Get Out and Get Under". Enjoy the fun of family picnics, the joys of people in the last untroubled time in our history.

And commercials that help you sell . . .

See How man stumbled on the concept of the wheel.



See Why America's railroads have always led the world.



See Why Americans jump for the latest thing in cars.

See One man push a freight car all by himself.

Years of national and trade advertising have made the name "Timken" the best-known name in bearings. People have learned to look for Timken® bearings wherever wheels and shafts turn. Shippers have learned that the railroads are switching to "Roller Freight"—using Timken bearings on freight cars. And they know that "Roller Freight" makes their shipping even more reliable—making Timken bearings a big plus in railroad freight sales. Now network television will build an even greater awareness of Timken bearings—make them a bigger plus in gaining business for the railroads. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

...ished in 1832

RAILWAY LOCOMOTIVES AND CARS

OCTOBER 1957

A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION

RR

OCT 9 1957

UP

OCT 7 1957

TRANSPORTATION

...formerly ...Mechanical and ...Electrical Engineer

...moke Shop

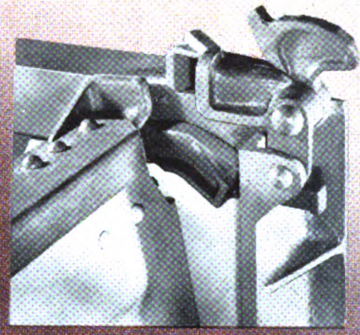
...Engine ...haul

...E Box Cars for ...Plate Traffic

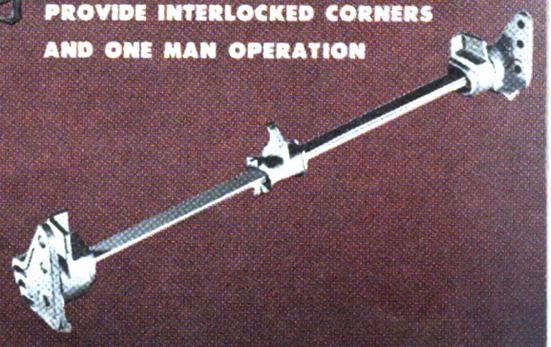
...d' Shop ...des Automation

INCORPORATED DROP-END UNITS

Speed Service.. Sustain Structure



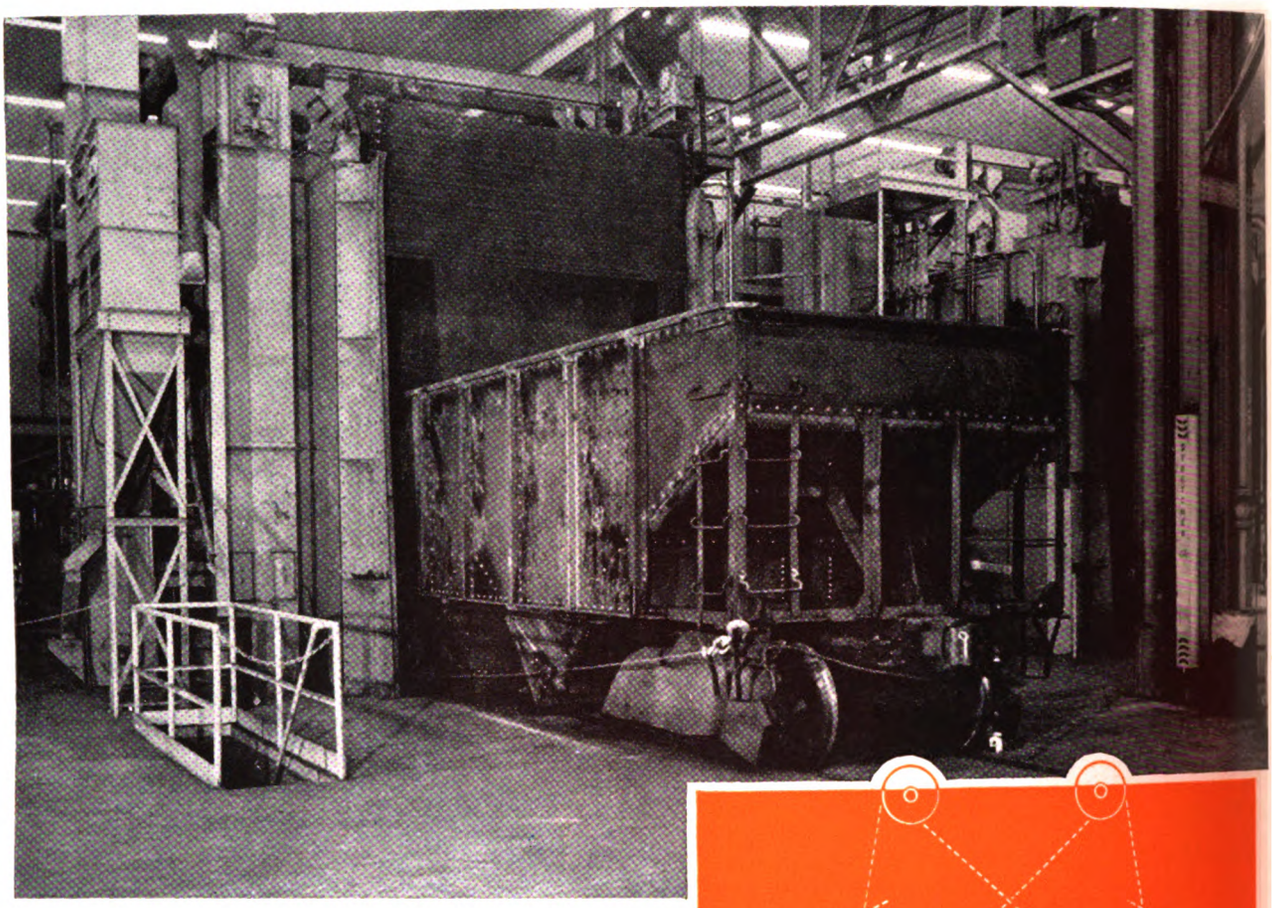
PROVIDE INTERLOCKED CORNERS AND ONE MAN OPERATION



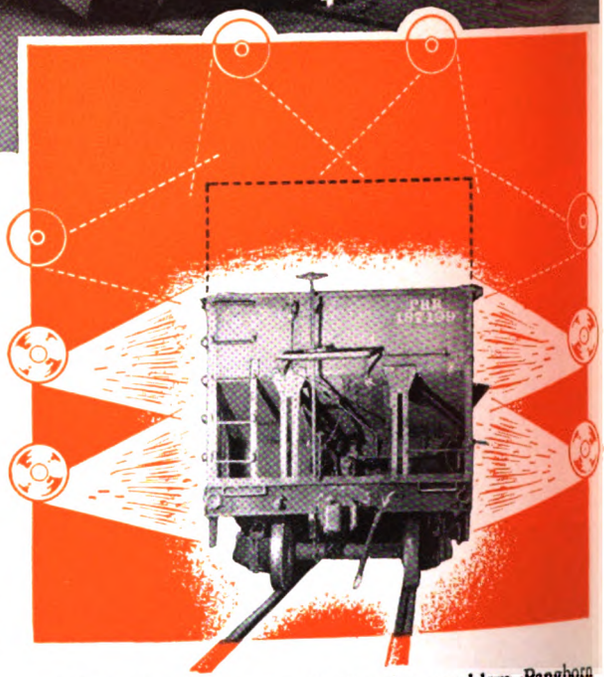
WINE

Drop End Locks and End Balancers

THE WINE RAILWAY APPLIANCE COMPANY



AUTOMATIC Pangborn Rotoblast cuts freight car cleaning time 85%!



In the Pennsylvania RR's Samuel Rea Shop, Hollidaysburg, Pa., hopper cars and boxcars are Rotoblasted before painting and stenciling. With the equipment previously used for this job, five men each spent an average of 2.7 hours cleaning a typical 42-ft. hopper car. Today, using special Pangborn Rotoblast Rooms for the same job, the railroad has cut labor to *four* men per unit—and they *turn out four cars every hour!* In addition to cutting man-hours 85%, the quality of cleaning is far better than before.

If you have an unusual cleaning problem, Pangborn offers a special service. Pangborn engineers will study your problem and its relation to your production line. Then they will design a Rotoblasting machine for your particular needs. Find out now how Pangborn's engineering service can give you better cleaning and faster production at lower cost.

Write today for Bulletin 1210A to PANGBORN CORP., 3700 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn ROTOBLAST® cleans cheaper

OCT 7 1957
TRANSPORTATION LIBRARY

NEW ESSO ARAPEN GEAR LUBRICANT GIVES TRACTION MOTOR GEARS DEPENDABLE LUBRICATION FOR OVER SIX MONTHS

...WITHOUT GREASE ADDITION!

Arapen Gear Lubricant—an important new traction motor gear lubricant developed by Esso Research – is now available to *you*. But before going on the market, this remarkable new product was thoroughly tested in the lab and *on the road*.

On the New York Central . . . Arapen Gear Lubricant was tested for 18 months in regular diesel freight service. The test proved the feasibility of six months' operation without additional lubrication.

NEW YORK CENTRAL SYSTEM

Performance Advantages of ARAPEN GEAR LUBRICANT:

ANTI-LEAKAGE CHARACTERISTICS: maintains consistency through full range of operating temperatures, resulting in a minimum of drippage on ties, pits and station platforms.

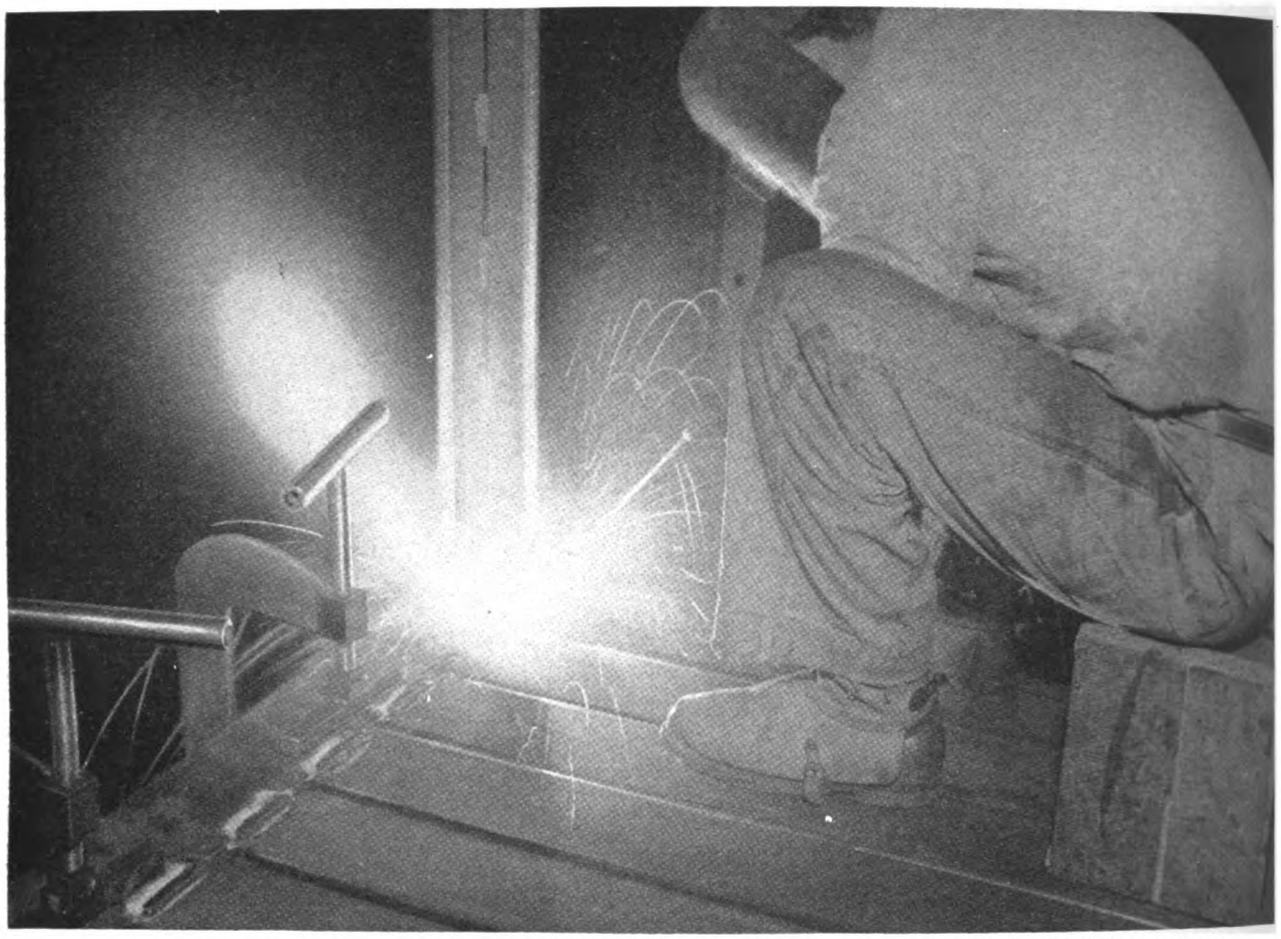
EXCELLENT OXIDATION STABILITY: permits extended operation without hardening.

EXCELLENT STRUCTURE STABILITY: minimizes failures due to dry gears because of excessive gear case leakage.

EXCELLENT WEAR CHARACTERISTICS: provides proper lubrication throughout life of gears.

For complete information and technical assistance in the use of new Esso Arapen Gear Lubricant, call your local Esso office or write: Esso Standard Oil Co., Railroad Sales Div., 15 W. 51st Street, New York 19, N. Y.

Esso
RAILROAD PRODUCTS



P-S nailable steel floor

design details permit superior welding features throughout

The continuing attention given to such vital areas as welding processes and methods is another reason why prominent carriers have selected P-S Nailable Steel Floor for installation in over 2,500 cars now in service or on order with Pullman-Standard. They have found that this concern with all phases of fabrication and installation provides a car floor that gives more nailing space, more nail holding power, greater strength and minimizes maintenance.

FOR PROOF on how Pullman-Standard Nailable Steel Floor provides outstanding lading and equipment protection, write to Pullman-Standard or contact your nearest P-S Sales Office.

WORLD'S LARGEST BUILDER OF ROLLING STOCK

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

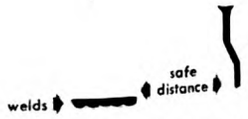
221 N. LA SALLE STREET • CHICAGO 1, ILLINOIS

BIRMINGHAM • PITTSBURGH • NEW YORK • SAN FRANCISCO

P-S Nailable Steel Floor becomes a permanent installation, minimizing floor maintenance and adding to car strength.

MORE WELDS, fourteen per plank, join each floor plank to the next. Joints won't rupture, nail holding power is always good.

LONGER WELDS made to squared heel of plank support angle provide 64% more attachment to underframe and reduce danger of undercutting.



SAFER WELDING CONDITIONS when attaching floor to underframe. Welds are made to copper-bearing steel support angles, not near nailing grooves. No molten filler endangers welder, no chance of fire.

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SIMMONS-BOARDMAN

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

OCTOBER 1957 VOLUME 131, No. 10

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Inspecting F-M Cylinder Liner Water Jackets, Testing UP Lash Adjustors, Cleaning C&EI Power Assemblies.

ELECTRICAL

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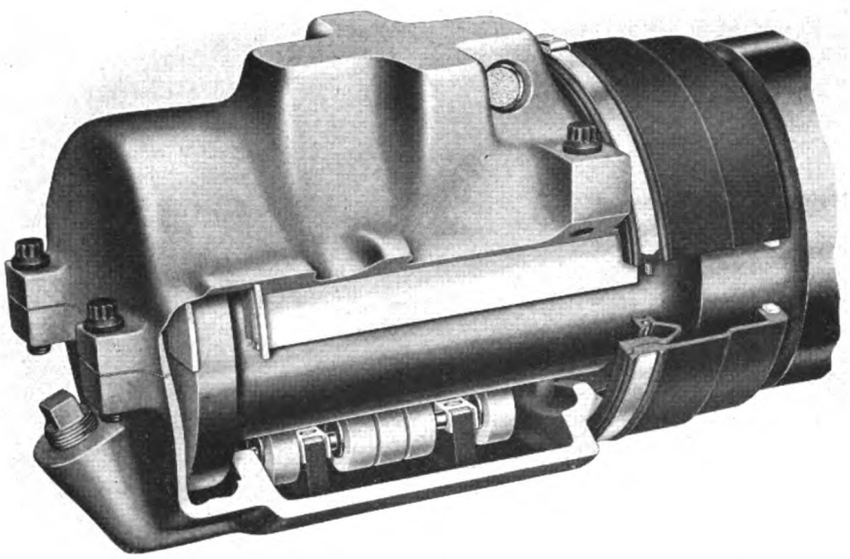
NEXT MONTH:

How UP Tests Streamliner Brakes

24-RL Brake in Color Schematics

Roll Them Out Like New—Part 5



Traction Gear Lubricant

Trojan R-104 is a traction motor gear lubricant said to have excellent cold-temperature viscosity characteristics and to retain proper consistency at all operating temperatures. This means less gear case leakage. Oxidation inhibitors are added to provide constant, even application throughout heavy and prolonged operations. The lubricant's extreme pressure properties have been proven by its successfully passing the Timken 40-lb load test. In bulk the material is available in 120- and 400-lb drum and is also supplied in 1-lb poly bags which can be dropped into the gear case where the bag disintegrates and becomes an integral part of the lubricant. *Cities Service Petroleum Inc., Dept. RLC, 54 Wall st., New York 5.*

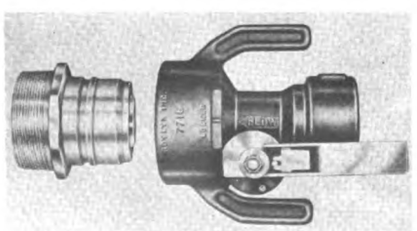
Cartridge Bearing

A journal bearing cartridge for freight cars has been developed by Cleveland Graphite Bronze Division of Clevite Corp. Tested by AAR and approved for limited application in interchange service, the Clevite bearing cartridge has 18 months of trouble-free road service, and continuing road tests are in progress.

The unit is simple to install and requires a minimum of modification using a few standard tools. The main sleeve bearing and two thrust bearings—formed to provide 180-deg arc of contact with journal and collar—are steel-backed lead-base babbitt with a tin alloy to prevent oil corrosion.

Two positive seals, a double-lipped oil seal and a dust guard, function independently. The oil seal, made of Buna-N synthetic rubber has high oil resistance and temperature characteristics. A garter spring retains seal in positive contact around journal; the sealing edge formed has a double lip, with primary and secondary oil seal at all times. Dust guard of weather resistant neoprene keeps dust and dirt particles away from oil sealing surfaces. At continuous point of contact with the dust guard seat, a felt seal retains wiping action indefinitely.

Two oil reservoirs—main sump and collar well—hold 1½ pts of oil. The collar well is replenished by oil flow from the journal plus oil mist created during operation. The lubricator consists of five hard felt rollers kept in constant contact with the rotating journal by confined compression springs. Oil is applied by direct rolling action; excess oil acts as a cooling agent. Distributed by *Standard Car Truck Co., Dept. RLC, 332 S. Michigan ave., Chicago 4.*

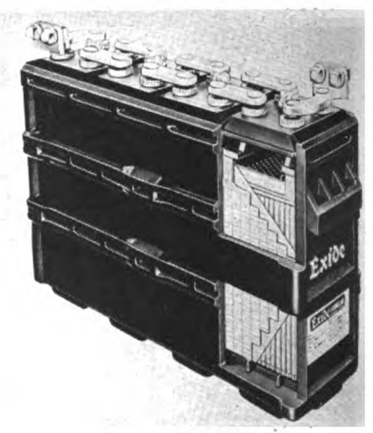


Diesel Fueling Coupling

This diesel fueling coupling-valve is said to eliminate spillage, reduce sewage contamination, and cut fueling time up to 30 per cent.

Employing the Roylyn "Quick-Lock" principle, incorporating an inclined plane and balls, the coupling is positively connected or disconnected from the mating nipple simply and easily with only a quarter-turn of the collar-cam assembly. The audible "click" of the balls dropping into their locking pocket, plus the visible "locked" marking on the collar, indicates a leakproof, spillproof and vibration-proof connection. The valve control mechanism is designed to interlock with the collar of the coupling to preclude disconnection of the coupling unless the valve is fully closed.

Cleaner fuel is assured by a strainer installed in the inlet to valve. This prevents segments of deteriorated hose and other foreign matter from entering tank. *Airaterra, Dept. RLC, 1706 Standard ave., Glendale 1, Calif.*



High-Power Cranking Battery

A new lead-acid storage battery designated as Type TG Exide-Iron-clad Giant for the operation of industrial trucks was announced a short time ago. Another battery of similar construction, designated Type MGD is now available for diesel locomotive cranking.

Active material on the plates is held securely in place by armored porous tubing, made of continuous-filament glass fibers within a perforated polyvinyl chloride armor. It is a construction which is designed to increase both life and capacity. As applied to cranking, it gives a 50 per cent increase over present tubular-plate-type batteries in amperes discharged at diesel engine cranking rates.

A new MGD battery normally furnished for switching locomotives (600 to 1,200 hp) will deliver power equivalent

(*Continued on page 58*)

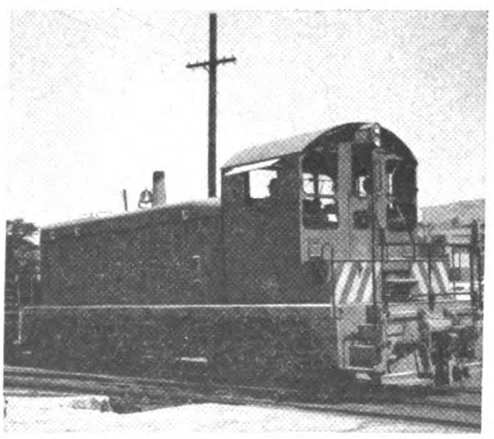
ENGINEER'S FIELD REPORT

PRODUCT **RPM DELO OIL RR**

FIRM **BAMBERGER RAILROAD CO.**
Salt Lake City, Utah

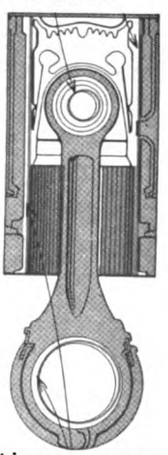
5 years without overhaul on RPM DELO Oil

Lubricated with RPM DELO Oil RR since going into service, three switch locomotives of Bamberger Railroad have worked over five years without a major overhaul. "The oil does such a good job of protecting engines that I've never had to repair or replace a part because of faulty lubrication," says General Shop Foreman J. F. Buckley (below). "Every time we've opened the engines for inspection we've found them clean, free of carbon or lacquer deposits." Bamberger hauls general freight between lines of UP, WP, SP, and D&RGW over 36.9 miles of its own mainline track between Salt Lake City and Ogden.



Clean piston (above) has no measurable wear, shows the kind of performance Bamberger gets with RPM DELO Oil RR. "We simply wipe off parts and they're bright and shining," says Mr. Buckley. Firm's EMD 800's (#601 top right, #602 above) deliver cars to sidings and make up trains for larger locomotive—work an average of 16 hours a day. Engine #570 (top left) makes the Salt Lake–Ogden run, works 10 to 12 hours daily.

Why RPM DELO OIL RR reduces wear, corrosion



- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists foaming

For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

LUBRICATING OILS RPM DELO

TRADEMARKS "RPM DELO" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

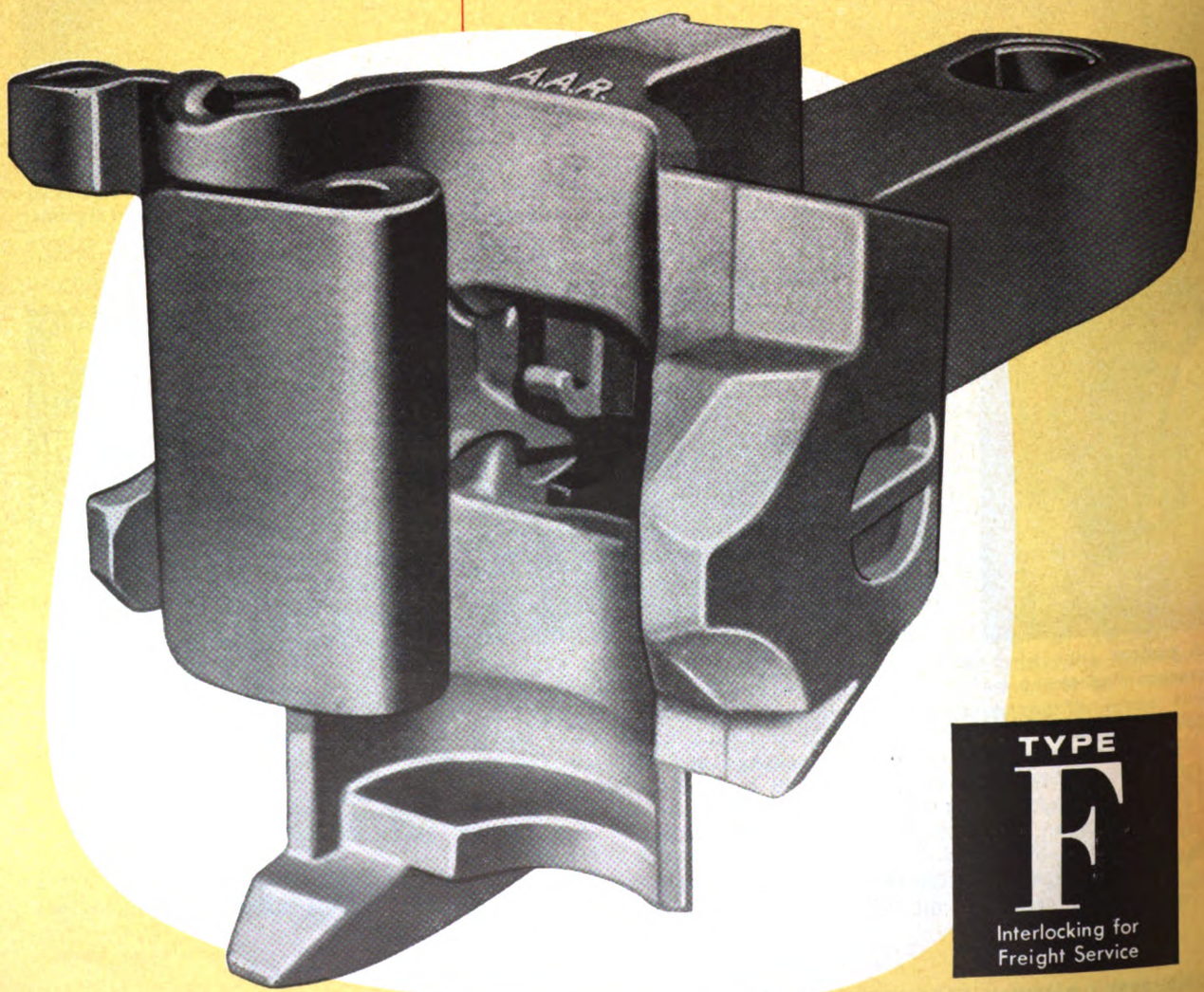
STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

There's Improved Railroading with

National Specialties

Example:

NATIONAL

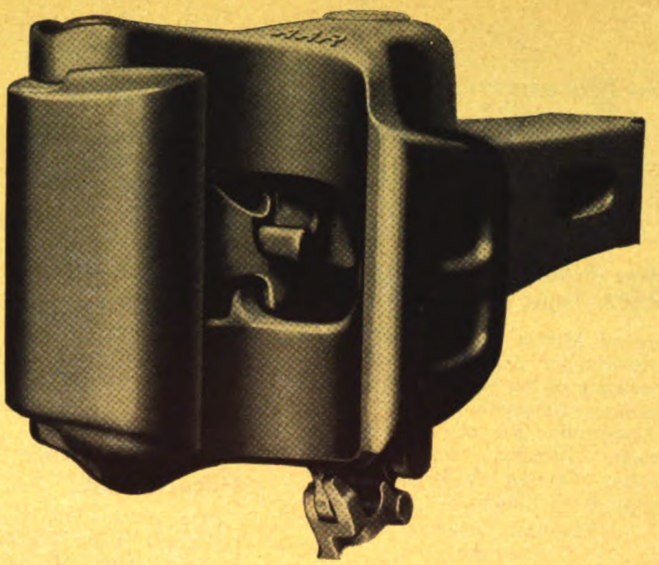


TYPE

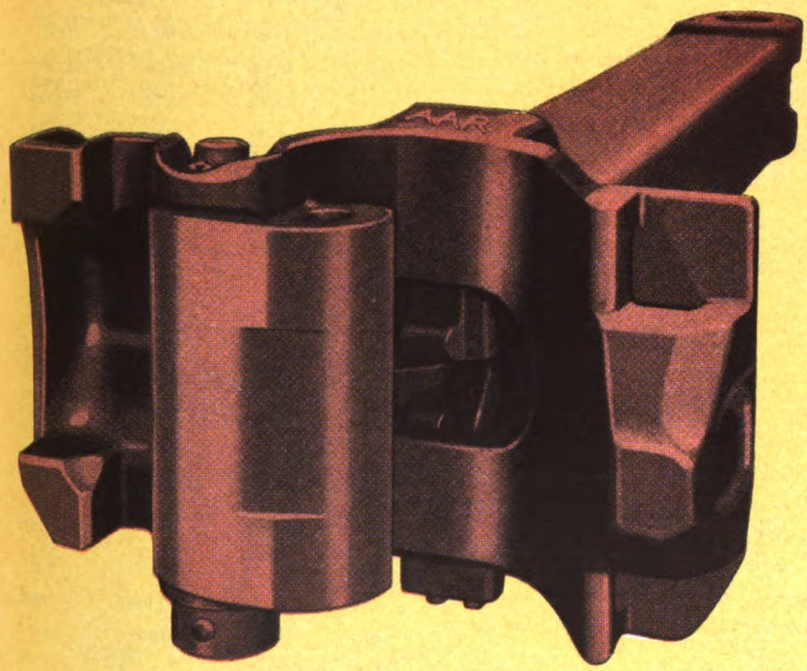
F

Interlocking for
Freight Service

TYPE
E
Standard for
Freight Service



COUPLERS



The development of the automatic railroad coupler parallels the experience of National as a coupler manufacturer. And today, as always, National couplers meet all AAR specifications for gauging and inspection. Close quality control, unmatched testing facilities, nationwide and international service—spell National coupler leadership. Always look for the name National—the name that *means* couplers.

AA-5268

TYPE
H
Tightlock for
Passenger Service

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Railway Division Headquarters
Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

Canadian Subsidiary
National Malleable & Steel Castings Company
of Canada, Ltd. • Toronto 1, Ontario

Established 1868

GEARED TO PROGRESS
P R I
MEMBER

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES

Motive Power Utilization Is RSPA Topic

Improved Motive Power Utilization is the subject for discussion at the 1957 fall meeting of the Railway Systems and Procedures Association to be held in the Constitution Room, Morrison Hotel, Chicago, Tuesday, Wednesday and Thursday, October 8, 9 and 10. The program is as follows.

TUESDAY, OCTOBER 8

10 am

Address: Patrick B. McGinnis, president, Boston & Maine.

How a Centralized Motive-Power Control Bureau Contributes to Efficient Utilization on a Large Railroad, C. J. Haywood, director motive power control bureau, Pennsylvania.

2 pm

Applications of Operations Research to Improved Utilization of Motive Power, Russell L. Ackoff, professor director, and Maurice W. Sasieni, research associate, Operations Research Group, Case Institute of Technology.

How the B&M Uses Budd Rail Diesel Cars, E. K. Bloss, general mechanical superintendent, Boston & Main.

Utilization of Budd Rail Diesel Cars on the B&O, E. S. Rupp, assistant to vice-president, operation and maintenance, Baltimore & Ohio.

WEDNESDAY, OCTOBER 9

9:30 am

Improved Diesel Schedules, V. B. Gleaves, assistant to vice-president operations, St. Louis-San Francisco.

Mathematical Planning and Scheduling Freight-Trains Shipments on the Union, D. F. Morris, assistant to general manager, and H. R. Soyster, transportation engineer, Union Railroad.

Plane and Fancy Problems, Nelson B. Frye, assistant vice-president, traffic, Capital Airlines.

2 pm

How Preventive Maintenance Improves Motive Power Utilization, Carlton L. Hall, director diesel methods and procedures, New York Centeral System.

Panel Discussion: What Can Be Done To Get More Out of Motive-Power-Tested Practices Discusses. Are Wider Applications Necessary? Moderator: James H. Heron, superintendent of motive power, Great Northern.

THURSDAY, OCTOBER 10

9:30 am

Design for Utilization. *Design of the Services:* John S. Gallagher, Jr., director of passenger research, New York Central System. *Design of the Facilities:* Alan R. Cripe, director of design, Chesapeake & Ohio.

Uses of New Techniques on the French National Railroads, Pierre Deshayes, general representative for North America, French National Railroads.

12:30 pm

Address: John Nash, vice-president—operations, New York Central System. Subject: Forward Thinking—Forward Action.

Franklin Institute Honors AAR

The Association of American Railroads will be the recipient of the George R. Henderson Medal at the annual Medal Day ceremonies of the Franklin Institute on Wednesday, October 16, particularly "In recognition of the many achievements of the Mechanical and Engineering Divisions in the many fields of railway engineering . . ."

AC&Y Using Truck as Rolling Repair Shop

A specially designed International truck, with equipment capable of jacking up a diesel locomotive, is in service on the Akron, Canton & Youngstown as a repair-shop-on-wheels. Capabilities of the unit were demonstrated shortly after the

(*Continued on page 12*)

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of June 1957	Month of June 1956	6 months ended with June 1957	6 months ended with June 1956
3	Road locomotive miles (000) (M-211):				
3—06	Total, Diesel-electric	36.317	37.298	220.006	223.897
3—07	Total, electric	643	744	4.153	4.413
3—04	Total, locomotive-miles	39.046	42.206	238.801	254.159
4	Car-miles (000.000) (M-211):				
4—03	Loaded, total	1.614	1.699	9.674	10.158
4—06	Empty, total	929	946	5.682	5.632
6	Gross ton-miles-cars, contents and cabooses (000.000) (M-211):				
6—03	Total in Diesel-electric locomotive trains	109.060	108.652	648.612	644.031
6—04	Total in electric locomotive trains	2.194	2.347	13.096	13.561
6—06	Total in all trains	118.557	122.924	707.190	729.963
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10—02	Loaded freight car-miles	44.2	43.2	43.2	42.9
10—03	Empty freight car-miles	25.5	24.1	25.4	23.8
10—04	Total freight car-miles (excluding caboose)	69.7	67.3	68.6	66.7
10—05	Gross ton-miles (excluding locomotive and tender)	3,247	3,127	3,161	3,085
10—06	Net ton-miles	1,492	1,434	1,439	1,414
12	Net ton-miles per loaded car-mile (M-211)	33.7	33.2	33.3	32.9
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	63.5	64.2	63.0	64.3
14	Averages per train hour (M-211):				
14—01	Train miles	18.7	18.4	18.9	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	59,982	57,004	59,029	56,892
14	Miles per diesel-electric unit day (M-240):				
14—01	Road freight units	208.8	—	211.0	—
14—02	Road passenger units	451.5	—	440.4	—
17	Car-miles per freight car day (M-240):				
17—01	Serviceable	46.2	47.8	46.1	47.1
17—02	All	44.3	46.0	44.3	54.3
18	Average net ton-miles per freight car-day (M-240)	949	981	928	960
19	Per cent of home cars of total freight cars on the line (M-240)	109.7	112.1	110.8	112.1

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—06	Diesel-electric	19,417	20,214	116,444	121,586
3—07	Electric	1,112	1,212	7,056	7,617
3—04	Total	20,818	22,158	125,365	134,010
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	216,851	233,868	1,280,397	1,378,271
4—11	Total in Diesel-electric locomotive trains	201,279	213,179	1,180,894	1,248,205
12	Total car-miles per train-mile:	9.91	10.11	9.71	9.86

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,687,882	3,799,446	22,685,111	23,099,272
1—06	Total	3,838,665	4,080,379	23,689,003	24,796,337
2	Passenger yard switching hours				
2—03	Diesel-electric[1]	233,814	244,068	1,449,018	1,485,243
2—06	Total	260,443	276,150	1,619,301	1,692,923
3	Hours per yard locomotive-day:				
3—02	Diesel-electric	15.1	16.1	15.4	16.0
3—05	Serviceable	15.3	16.0	15.6	16.0
3—06	All locomotives (serviceable, unserviceable and stored)	14.1	14.7	14.4	14.5
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.63	1.67	1.69	1.69
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.74	0.73	0.78	0.76

[1] Excludes B and trailing A units

Why More and More Roads are Testing NATIONAL® Cartridge Bearings!

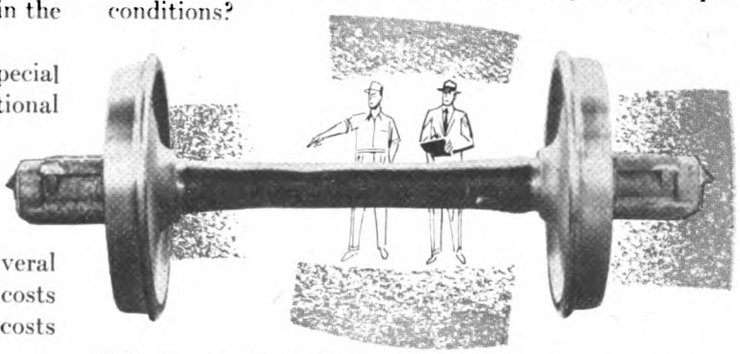
Tests under extreme operating conditions indicate a new standard of bearing performance for freight cars.

A few years ago, the National Cartridge Bearing was only a new concept in solid journal bearing design. Today, it is a reality—with thousands of miles in the toughest kinds of freight car service.

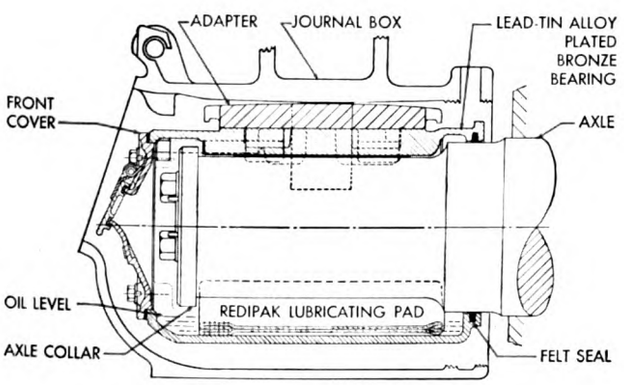
To date, over twenty roads are confirming what our special journal bearing laboratory has found: that the National Cartridge Bearing stands up to greater impact; that it requires very little maintenance; that it provides greatly lengthened life; that it minimizes the chance of hot boxes.

In addition, the National Cartridge Bearing offers several important savings over roller bearings: savings in first costs . . . savings in installation costs . . . savings in removal costs when a wheel change is needed.

If your road is not already testing this "journal bearing of the future," why not see for yourself what this remarkable new cartridge bearing can do under your particular operating conditions?



Wheel, axle and cartridge sets are made up in advance for assembly into trucks. No bearing work is done on the rip track.

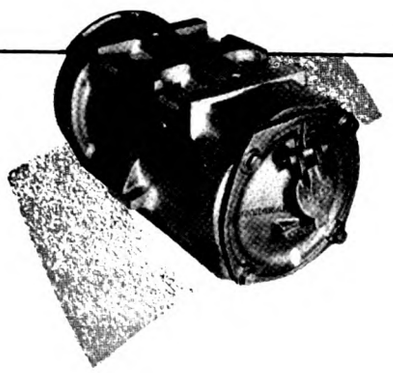


CROSS-SECTION OF NATIONAL CARTRIDGE JOURNAL BEARING UNIT

The cartridge bearing encircles the journal. The journal collar is machined off to permit assembly, and a separate collar is secured with cap screws. The cartridge unit, shown with an adapter, which can be used with an integral box or a pedestal side frame, is cast of high strength bronze and plated with a heavy-duty lead-tin alloy. It contains its own lubricating system and is effectively sealed by a lubricated felt ring riding on the conventional dust guard diameter. The lubricating pad is installed when the cartridge is applied to the axle. Oil is contained in the cartridge, not in the box. The usual journal box is not needed.

Brake Shoe

RAILROAD PRODUCTS DIVISION
530 Fifth Avenue • New York 36, N. Y.



NEWS

(*Continued from page 10*)

truck was placed in service, when it was used to jack up a heavy-duty flat car in order to make air brake repairs: After repairs were completed, the truck's air compressor went into use to conduct a brake test. The truck, with a 190-in. wheelbase, is equipped with a five-man cab, 4,000-lb capacity lift tail gate, air compressor, two 70-ton air jacks, power steering and power brakes. For emergency repair use, it can also haul three pairs of car wheels or two pairs of mounted diesel wheels to repair sites.

AAR Members Vote Brake Code Revision

Revision of the AAR's publication "Rules for Inspection, Testing and Maintenance of Air Brake and Signal Equipment on Locomotives and Cars" (the Red Book) has been approved by a vote of locomotive- and car-owning members of the Mechanical Division. This was submitted to ballot by the General Committee of the Division after action taken early in July by the Senate committee on interstate and foreign commerce (*Railway Locomotives and Cars, September, 1957, p 10*).

The Senate committee reported the "power brake bill" (Senate 1386) favorably with an amendment calling for ICC brake regulations to correspond with those of the AAR including "such provisions as may have been adopted prior to enactment [of the Senate bill]." The AAR vote makes the Red Book include the latest brake equipments and maintenance practices. However, no Senate action was taken on the Power brake bill before the end of the last session and nothing further can be done in Congress until January, 1958.

Accompanying the brake code revision was a second letter ballot calling for arbitrary scrapping of axles with journals seriously scored or gouged because of overheating. This requirement was accepted by a vote of car owners although there were 577,258 votes against it. A secondary requirement of this change will be that overheated axles with no surface damage must be inspected with both magnetic particle and ultrasonic methods before being reused. The changes will soon be incorporated in the Interchange Rules and the Wheel and Axle Manual, and expense will be borne by the handling line.

Miscellaneous Publications

FUNDAMENTALS OF WELDING. First of five sections of Welding Handbook, previously published as a single volume, contains in 11 chapters the basic material needed by all associated with welding activities. Where possible, information has been tabulated. *American Welding Society, 33 West 39th st., New York 18. Price, $9 per volume.*

"PRODUCT RESEARCH AND DEVELOPMENT." 20-page booklet describes services offered by the Franklin Laboratories and, under headings "Product Planning and Design," "Materials," "Production," and "Processes," lists specific areas in which the Laboratories are staffed and equipped to perform research and development. *Manager, Information Services Department, Franklin Institute Laboratories,* 20th and Parkway, Philadelphia 3.

FILLER METAL COMPARISON CHARTS. Brand names of 61 companies, 12 AWS-ASTM specifications, and two indexes listing brands and manufacturers names included in 24-page booklet of welding rod and electrode comparison charts. Answers questions concerning classification of Brand X, if Brand X comes within same classification as Brand Y, who makes it, and who distributes it. *American Welding Society, 33 West 39th st., New York 18. Price $2.*

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE SEPTEMBER ISSUE

FREIGHT-CAR ORDERS

Road and builder	*No. of cars*	*Type of car*	*Tons*	*Other detail*
CANADIAN NATIONAL: Canadian Car	2	Depressed-center flat	—	To weigh 98 tons each when loaded. For delivery early next year.
CHICAGO, ROCK ISLAND & PACIFIC Company shops	100	Flat	50	50 cars, with riveted frames, to cost approx. $8,576 each; other 50, with cast-steel frames, approx. $10,182 each. First quarter 1958 delivery.
DELAWARE & HUDSON: Company shops	3	Well type flat	60	
	2	Flat	250	Delivery 6 cars expected second quarter 1958.
	1	Depressed center flat	125	
DENVER & RIO GRANDE WESTERN: ACF Industries	50	Covered hopper	70	Estimated unit cost, $11,000. Delivery second quarter 1958.
ST. LOUIS-SOUTHWESTERN: Pacific Car & Fdry.	25	Insulated box	50	Approx. unit cost, $14,735. For January delivery.

Personal Mention

Canadian National.—*Moncton, N.B.*: BLAIR E. BAYNE appointed supervisor diesel equipment, Atlantic Region. MURRAY D. ATKINSON appointed regional diesel supervisor. ROBERT R. O'BLENIS appointed regional diesel instructor. RALPH T. DUNBAR appointed general foreman, motive power shops; GERARD A. JOHNSON, foreman, and JOHN K. MCKINNON, night foreman, diesel shop.

Chesapeake & Ohio.—H. M. VISE, JR., assistant to general superintendent car department, Richmond, Va., appointed assistant superintendent car department, Grand Rapids, Mich. S. M. EHRMAN, general foreman car department, Columbus, Ohio, appointed assistant to general superintendent car department at Richmond. D. H. RICHMOND appointed assistant general master mechanic, Huntington, W. Va. Position of master mechanic at Huntington abolished. Jurisdiction of J. C. SMITH, general master mechanic, Richmond, extended to include entire Eastern region. Jurisdiction of L. H. BOOTH, general master mechanic Huntington, extended to include entire Central region. F. H. PORTER, general foreman locomotive department, Richmond, given responsibility for both locomotive and car department matters. Richmond division.

Chicago, Burlington & Quincy.—L. E. QUIRIN, district master mechanic, Chicago, appointed shop superintendent, Aurora, Ill.

(*Continued on page 14*)

SUMMARY OF MONTHLY HOT BOX REPORTS

Month	Cars set off between terminals with Hot Boxes: System	Foreign	Miles per car set off
June, 1953	8,537	15,296	122,771
June, 1954	6,597	9,617	164,202
1955			
June	6,080	10,226	180,666
July	8,086	13,635	133,813
August	8,555	14,358	128,941
September	5,896	10,469	178,649
October	3,966	7,182	271,364
November	2,010	3,972	493,184
December	1,819	3,774	522,444
1956			
January	2,029	4,302	462,029
February	2,570	5,611	341,542
March	2,517	6,212	346,853
April	3,202	6,881	290,626
May	4,672	10,903	196,688
June	6,777	15,125	135,774
July	8,484	16,067	113,573
August	9,891	16,892	113,474
September	6,834	12,629	149,970
October	4,357	8,429	243,505
November	2,650	5,560	359,759
December	2,256	4,436	438,425
1957			
January	3,373	6,121	291,453
February	3,272	6,844	264,538
March	3,164	6,687	307,306
April	3,949	8,447	228,493
May	6,580	12,691	154,387
June	8,285	16,277	115,749

SIOUX TOOLS LAST LONGER!

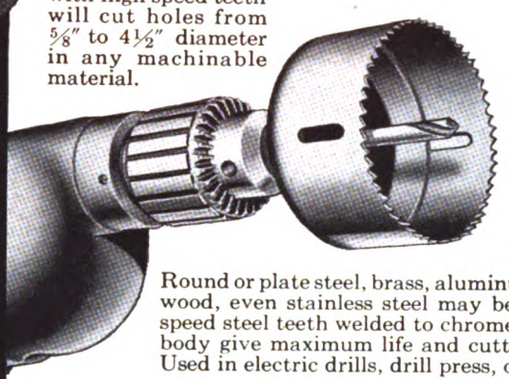
PORTABLE GRINDERS

A Dependable, Heavy Duty Tool for Grinding, Buffing, Wire Brushing. 5″ and 6″ Wheel Diameters. Carefully Balanced for Easy Handling.

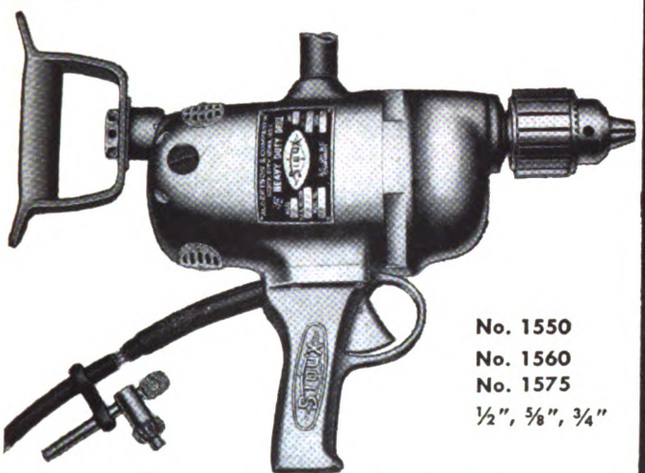
Sioux Quality Throughout.

High Speed HOLE SAWS

SIOUX Hole Saws with high speed teeth will cut holes from ⅝″ to 4½″ diameter in any machinable material.



Round or plate steel, brass, aluminum, bronze, wood, even stainless steel may be cut. High speed steel teeth welded to chrome vanadium body give maximum life and cutting ability. Used in electric drills, drill press, or lathe.



No. 1550
No. 1560
No. 1575
½″, ⅜″, ¼″

ELECTRIC DRILLS

- Advanced Design
- Balanced Power
- Rugged Construction
- A Size for Every Need
- SIOUX Dependability
- No Drill is Built to Last Longer

WIRE WHEEL BRUSHES

Durably built of special brushing wire with wide face, even trim, perfect balance. Designed for heavy duty cleaning, removing, deburring, descaling, roughing, buffing, and polishing.

Torque or saucer shaped brushes are fast workers for body repair, removing paint, scale or corrosion, cleaning welded joints, etc. Used with Sioux flexible shafts or portable tools the broad brushing area cleans large areas in less time.

SIOUX

ALBERTSON & CO., INC.
SIOUX CITY, IOWA, U.S.A.

LOOK UNDER ELECTRIC TOOLS!

ELECTRIC DRILLS • SCREW DRIVERS • SANDERS • GRINDERS • IMPACT WRENCHES • VALVE FACE GRINDING MACHINES • POLISHERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS

Cut Down on Cleaning Time in Diesel Interiors

Cleaning engine exteriors, floors, walls need not be a time-consuming job. You can cut down on time and manpower with Magnus Diesel Magnusol.

Safe and Sure . . . Magnus Diesel Magnusol is a fast-working easily applied cleaner. Just mix the concentrated cleaner with water . . . spray it on all surfaces to be cleaned . . . After soaking for a short time, flush the cleaner and dirt away with water. Surfaces are really clean! Diesel Magnusol is harmless to paints, metals and personnel and is non-toxic and non-flammable.

For every dirty job in all railroad maintenance there is a specialized Magnus material, machine, method to speed up down time, clean more efficiently. Write for your copy of the Magnus Railroad Handbook to Magnus, 77 South Ave., Garwood, N. J.

magnus

RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
a world-wide organization specializing in cleaning and protection of all surfaces.

PERSONAL MENTION

(*Continued from page 12*)

Delaware & Hudson.—*Colonie, N.Y.*: ABRAM C. ALLEN, master mechanic Pennsylvania-Susquehanna Division, appointed master mechanic, system. AUGUST N. BAMBICHLER appointed assistant master mechanic, Saratoga-Champlain Division. THOMAS J. BRADLEY, assistant general supervisor, appointed diesel supervisor. *Oneonta, N.Y.*: CLAUDE E. GREGORY, general car foreman, appointed assistant master mechanic, Pennsylvania-Susquehanna Division.

Elgin, Joliet & Eastern.—ROBERT E. BRAY appointed car foreman, Kirk Yard, Gary, Ind. LOUIS J. VERBICH appointed car foreman at South Chicago, Ill. ORRIN R. BURROUGHS appointed car foreman at Joliet, Ill.

Erie.—LAWRENCE E. SCHUETTE, supervisor of car repairs at Cleveland, O. promoted to assistant superintendent, car department—territory west of Cuba, N.Y. Headquarters, Cleveland. DAVID H. DECKER, superintendent of car shops, Susquehanna, Pa., promoted to supervisor of car repairs—Cuba, N.Y., and east. Headquarters, Susquehanna.

Louisville & Nashville.—*Corbin, Ky.*: J. W. STEPHENS appointed master mechanic. E. O. ROLLINGS, JR., foreman, diesel parts repair, appointed general foreman succeeding Mr. Stephens.

Missouri Pacific.—L. W. MARTIN appointed master mechanic, Settegast Terminal, Houston, Tex. Division assignments for road master mechanics as follows: *Osawatomie, Kan.* A. J. DANIEL, Central Kansas and Colorado divisions. *Kansas City, Mo.* E. E. DENT, Eastern, Omaha, Northern Kansas, Joplin and White River divisions. *Coffeyville, Kan.* J. C. DIETRICH, Southern Kansas, Central and Wichita divisions.

New York Central.—RAYMOND F. SWANSON, shop and equipment inspector at Collinwood, Ohio, appointed supervisor, material tests, Technical Research Department.

Norfolk & Western.—W. O. HUNT, JR., mechanical inspector, office of general superintendent motive power, Roanoke, Va., appointed assistant enginehouse foreman at Shaffers Crossing, succeeding W. PALMER KELLEY, retired. M. M. EARLY appointed mechanical inspector at Roanoke.

Pennsylvania.—J. F. HILDABRAND, assistant to supervisor methods and cost control, appointed foreman, methods and cost control, Altoona (Pa.) Works.

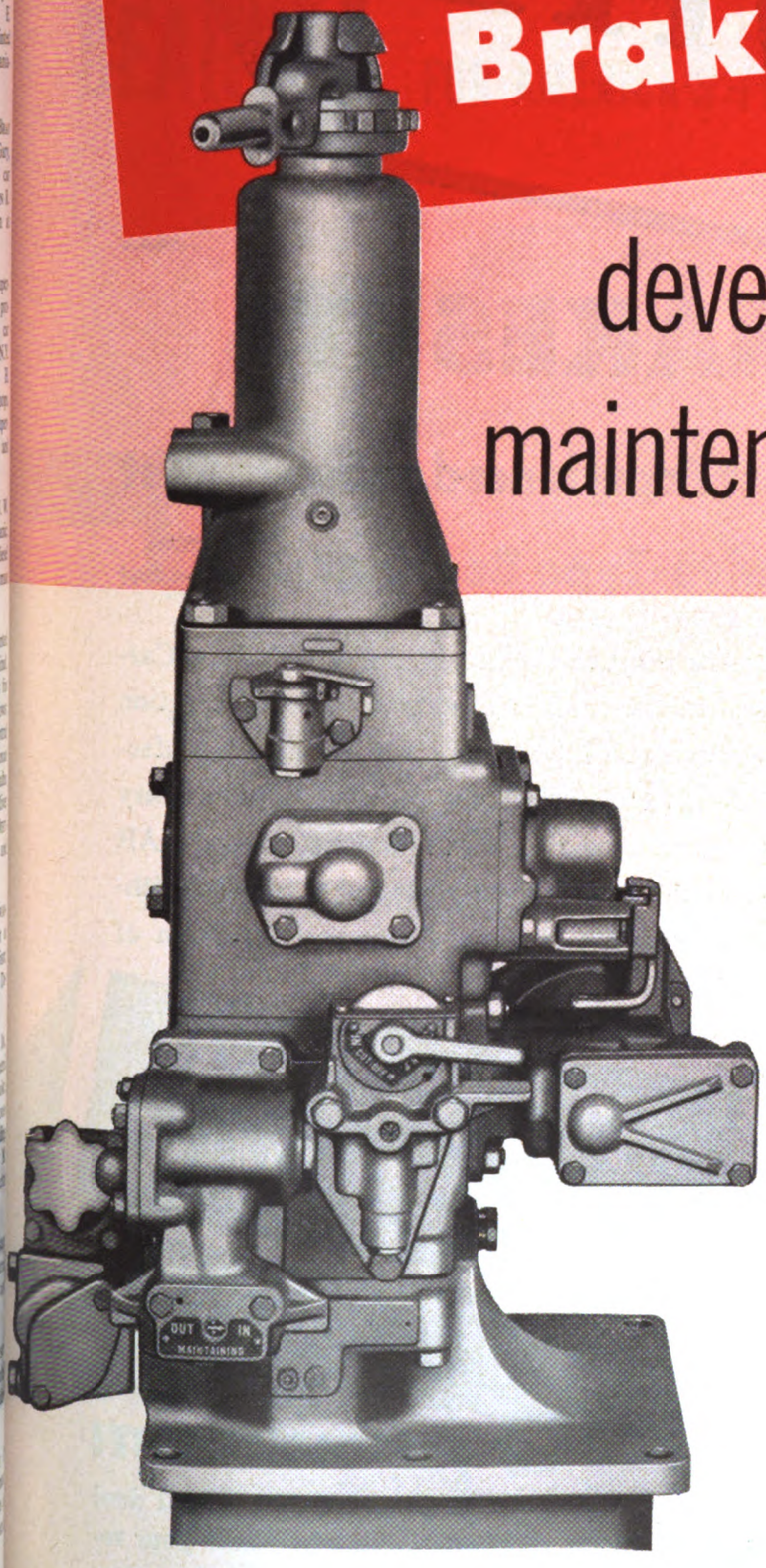
St. Louis Southwestern.—T. A. TENNYSON appointed engineer of tests and sanitation at Mt. Pleasant, Tex., succeeding H. W. VAN HOVENBERG retired.

Southern.—*Spencer, N. C.*: HENRY J. ELROD, appointed general foreman. Formerly general foreman car repairs at Macon, Ga. JOHN J. DEMSHOCK, general

(*Continued on page 18*)

DS-24-M Brake Valve

develops outstanding maintenance economies



THE Brake Pipe Pressure Maintaining Feature provides more uniform distribution of braking throughout the train. It develops these outstanding maintenance economies—

1. Less rigging maintenance and fewer damaged brake heads.
2. More uniform brake shoe wear.
3. Reduced wheel damage from overheating at front end of train.

These economies can be realized on 24-RL Brake Valves now in service by substituting a Conversion Filling Piece for the existing filling piece.

Write for our Circular Notice No. 1130 which gives complete details.

Westinghouse Air Brake COMPANY

AIR BRAKE DIVISION WILMERDING, PENNA.

CLEVITE

MAKES IT!

World's Largest, Most Experienced Independent Manufacturer of Sleeve-Type Bearings

(One Million Bearings per Day)

It took a rare combination to create the Clevite Sealed Sleeve Bearing Cartridge. Cooperation and operating experience of railroaders plus concentration of the vast Clevite experience, research and laboratory facilities and manufacturing processes that produce millions of bearings for industry and military forces. The results—a change-over journal bearing that is built to exceed AAR requirements for "hot box" elimination and meets the high quality-with-economy standards of Cleveland Graphite Bronze Company Division of Clevite Corporation, Cleveland 10, Ohio.

Largest Supplier of Stabilized Trucks

(Over 450,000 car sets of Barber Stabilized Trucks Sold)

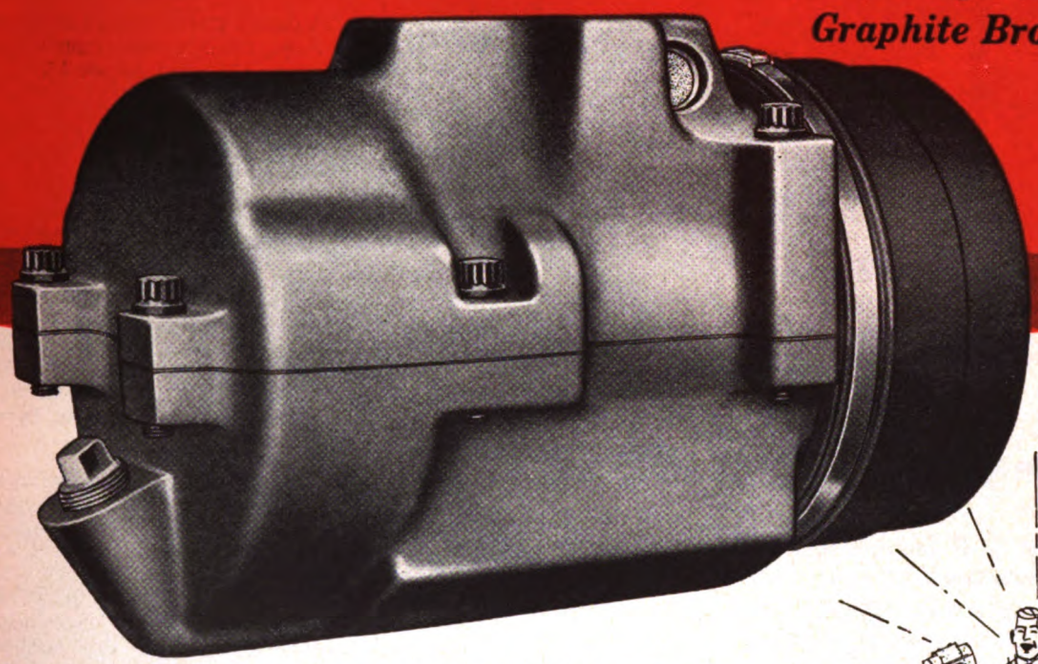
STANDARD CAR TRUCK COMPANY

DISTRIBUTES IT!

What's more, you'll get the hard-earned railroading experience, engineering skill and continuing maintenance follow-up that have made Barber a trusted name wherever freight cars roll. You'll deal with representatives who know your requirements and how to meet them economically to lick the "hot box" headache.

...announces THE HIGH PERFORMING, ECONOMICAL CHANGE-OVER JOURNAL BEARING FOR AMERICA'S TWO MILLION FREIGHT CARS

(A development of Cleveland Graphite Bronze Company)



YOU SAW IT DEMONSTRATED AT CHICAGO

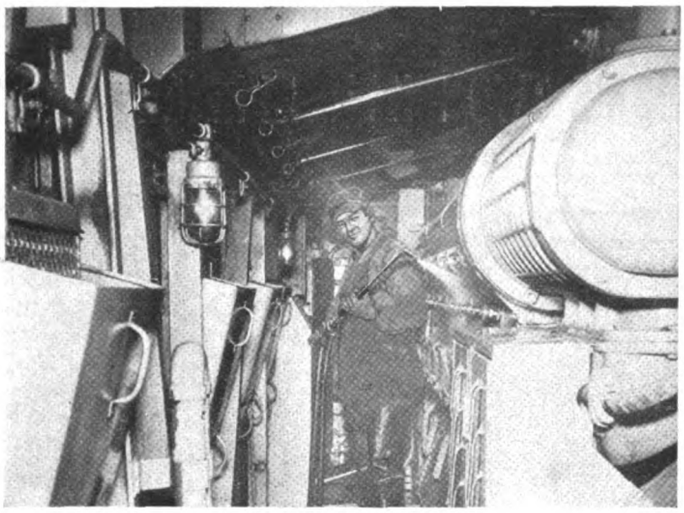
... It's the answer to railroadings *hottest* problem! Simple to install—requires less modification, so it's more economical. And when installed, it's a permanent and soundly engineered conversion. Tested by the AAR and approved for limited application in interchange service.

CLEVITE

SEALED SLEEVE BEARING CARTRIDGE

Write or Phone Distributor: Standard Car Truck Co., 332 S. Michigan Ave., Chicago 4, Ill.
(In Canada: Consolidated Equipment Co., Ltd., Montreal 2)

In DIESEL CLEANING, too



Oakite gives you

low-cost end results

RESULTS TALK! So if you're after genuine savings in diesel cleaning check the *results* Oakite delivers.

Take for example, the cleaning of diesel interiors. One Class 1 Road had been using an alleged "low-cost-per-pound" material for this critical job. Then they tried Oakite Composition No. 72—costing peanuts more per pound. Here are the *end results:*

In one month—washing 300 diesels—Road cut their cleaner poundage from 1200 lbs. to 337 lbs. They cut their monthly cleaner cost from $144.00 to $57.63. And they got better cleaning, better rinsing.

Another Road, using this same Oakite 72 for washing diesel exteriors, saves over $800.00 a month. They use 5.6 gallons at 2 oz/gal. as against 20 gallons at 6 oz/gal. per diesel. These figures speak for themselves. Results tell the true story.

Booklet F-8055 describes the many specialized Oakite materials and methods that guarantee economical railroad maintenance cleaning. Send for your copy to Oakite Products, Inc., 46 Rector Street, New York 6, New York.

gives you the important advantage . . .
LOW-COST END RESULTS

Export Division
Cable Address: Oakite

RAILROAD DIVISION

PERSONAL MENTION

(*Continued from page 14*)

foreman, appointed general foreman car repairs. *Hayne Shop, Spartanburg, S. C.:* JOHN O. GERSON, JR., appointed general foreman car department. Formerly production and material control engineer at Knoxivlle, Tenn. *Coster Shop, Knoxville:* JACK P. SATTERFIELD appointed cost control engineer. JACK R. BARKELY appointed production control engineer.

Union Pacific.—R. J. BERTI, assistant electrical engineer, Omaha, Neb., appointed electrical engineer succeeding D. G. WILLIAMS, retired.

Obituary

CLARENCE C. CORNEILS, superintendent of shops, Chicago, Burlington & Quincy, at Aurora, Ill., died August 14.

Supply Trade Notes

EX-CELL-O CORPORATION.—*Robert H. Watts* has been transferred from Detroit to the company's new warehouse and plant facility in Black Mountain. N. C. Mr. Watts will represent the railroad sales division throughout the southeastern territory.

■

THOMAS A. EDISON INDUSTRIES, EDISON STORAGE BATTERY DIVISION.—*Charles F. Farrell* has been appointed Seattle district manager.

■

GOULD-NATIONAL BATTERIES, INC.—*K. A. Vaughan,* export manager, has been appointed also northeastern regional manager for the industrial division.

■

PEERLESS EQUIPMENT, DIVISION OF POOR & CO.—*J. C. Fennelly Company,* San Francisco, has been appointed West Coast representative.

■

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY (CANADA) LTD.,—*R. G. Hudson,* works manager of the Lachine, Que. plant, has been appointed vice-president, succeeding *J. C. Lessard,* resigned.

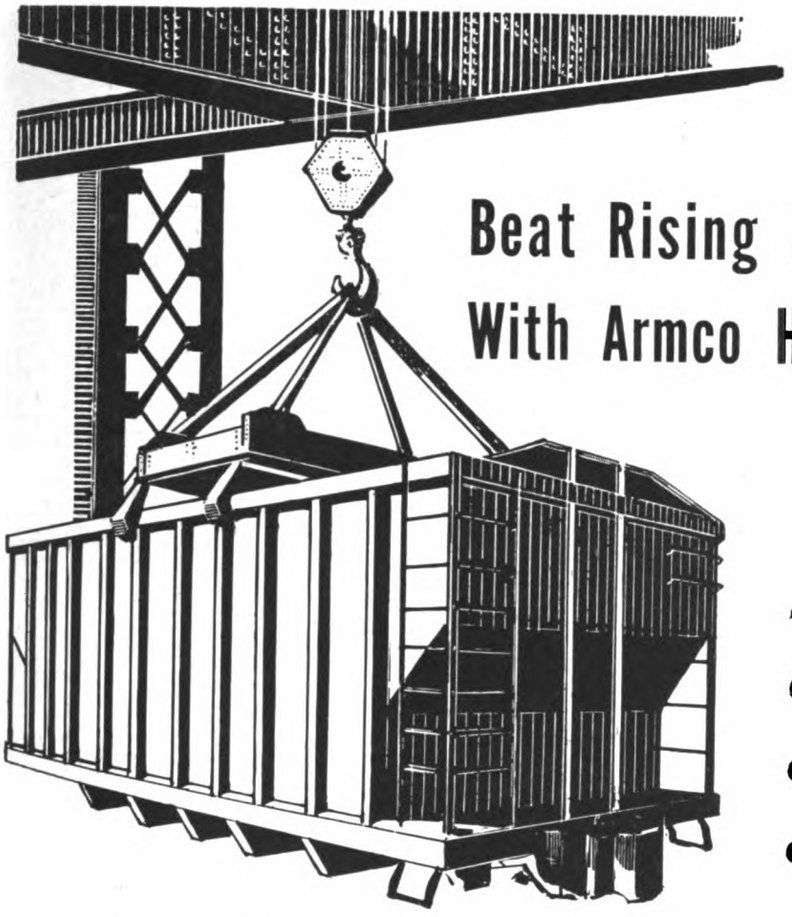
■

WESTINGHOUSE ELECTRIC CORPORATION.—*J. A. Walker* has been appointed area sales manager for the newly created transportation and maintenance sales area in the Chicago district. Mr. Walker will be responsible for the sale of Westinghouse electrical equipment to railroads and railroad suppliers and for the sale of maintenance services on electrical equipment for the company's Chicago repair shop.

■

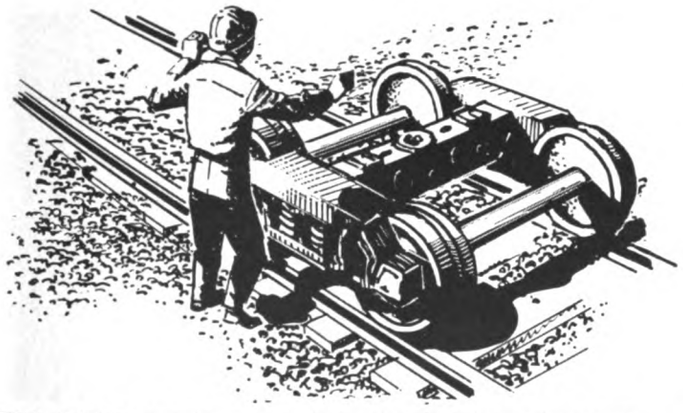
GENERAL AMERICAN TRANSPORTATION CORPORATION.—General American has completed a $750,-

(*Continued on page 52*)



Beat Rising Maintenance Costs With Armco High Strength Steel

. . . it extends car life, cuts down on repairs



Armco High Strength Steel keeps car maintenance costs low and cuts time-out-of-service in two ways:

1. Used in the same thicknesses as standard structural steel, it supplies greater strength to resist mechanical damage, shock and vibration—helps cars serve much longer before shop work is required.
2. This durable steel offers 4 to 6 times the atmospheric corrosion resistance of mild steel. The metal actually lasts longer in service.

Alternate Benefit

If you prefer to gain lighter car-weight and greater load-carrying capacity, Armco High Strength Steel offers a second revenue-boosting possibility. You can reduce thickness of car parts without sacrificing service life because of this metal's greater strength and corrosion resistance. Result: More cars per train.

Whether you are interested in reduced maintenance and longer car life, or bigger payloads, it will pay you to investigate low-alloy Armco High Strength Steel. Just fill in and mail the coupon for more information.

Armco Steel Corporation
1947 Curtis Street, Middletown, Ohio

Send me more information about Armco High Strength Steel.

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

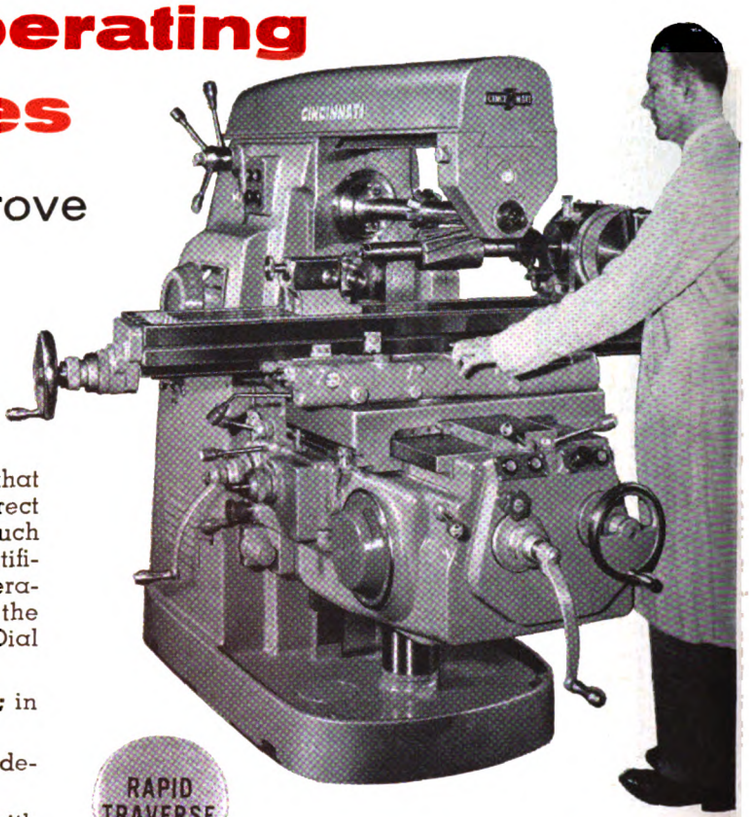
ARMCO STEEL CORPORATION

1947 Curtis Street, Middletown, Ohio

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

Dial Type Operating Conveniences

help the operator improve his performance



Ask the man at the machine. He'll tell you that built-in operating conveniences have a direct tie-in with costs. For example, consider a much appreciated Dial Type convenience like identification disks on control knobs. They jog the operator's memory; help him avoid wrecks between the cutter and work or fixture. Other CINCINNATI® Dial Type operating conveniences include:

Push-button selection of spindle speeds; in increasing or decreasing steps

Power feed change; in increasing or decreasing steps

Independent, directional controls; with palm-fitting plastic knobs

Dynapoise chatter-damping overarm; greatly reduces the noise of cutting action

Safe to operate; all hand cranks automatically disengaged when power feed or rapid traverse is engaged

Complete rear controls (Plain and Universal machines)

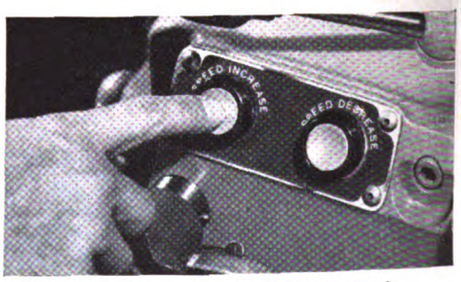
These are but a few reasons why Dial Type Milling Machines are tops with the operator. Want more information? Look in Sweet's Machine Tool File for brief specifications; complete data in catalog No. M-1915-2.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

Brief Specs, Dial Type Milling Machines

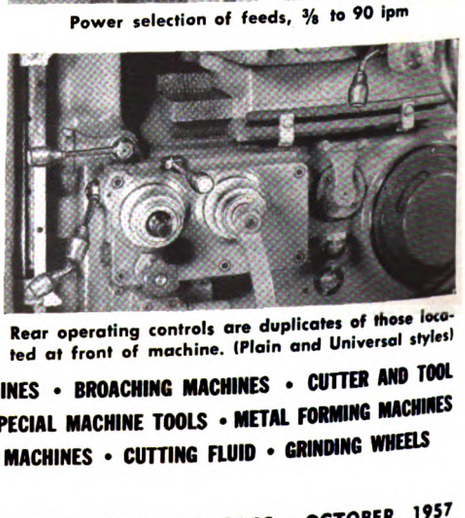
DIAL TYPE LINE		table traverse	main drive	automatic table cycles available
No. 2	Plain	28"	10 hp	yes
	Universal			no
	Vertical			yes
No. 3	Plain	34"	15 hp	yes
	Universal			no
	Vertical			yes
No. 4	Plain	42"	20 hp	yes
	Universal			no
	Vertical			yes

Identification disks on all control levers



Push-button selection of spindle speeds

Power selection of feeds, 3/8 to 90 ipm



Rear operating controls are duplicates of those located at front of machine. (Plain and Universal styles)

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

Ready for the road at the rate of twenty per day are these 70-ton hopper cars coming out of the paint building at the end of the production line in the Norfolk & Western's new Roanoke, Va., car shop.

New Shop Solving N&W Car Problems

Roanoke car shop is long-term solution to building and repair for busy coal road's 63,000-car fleet which may expand still more with continuing coal boom.

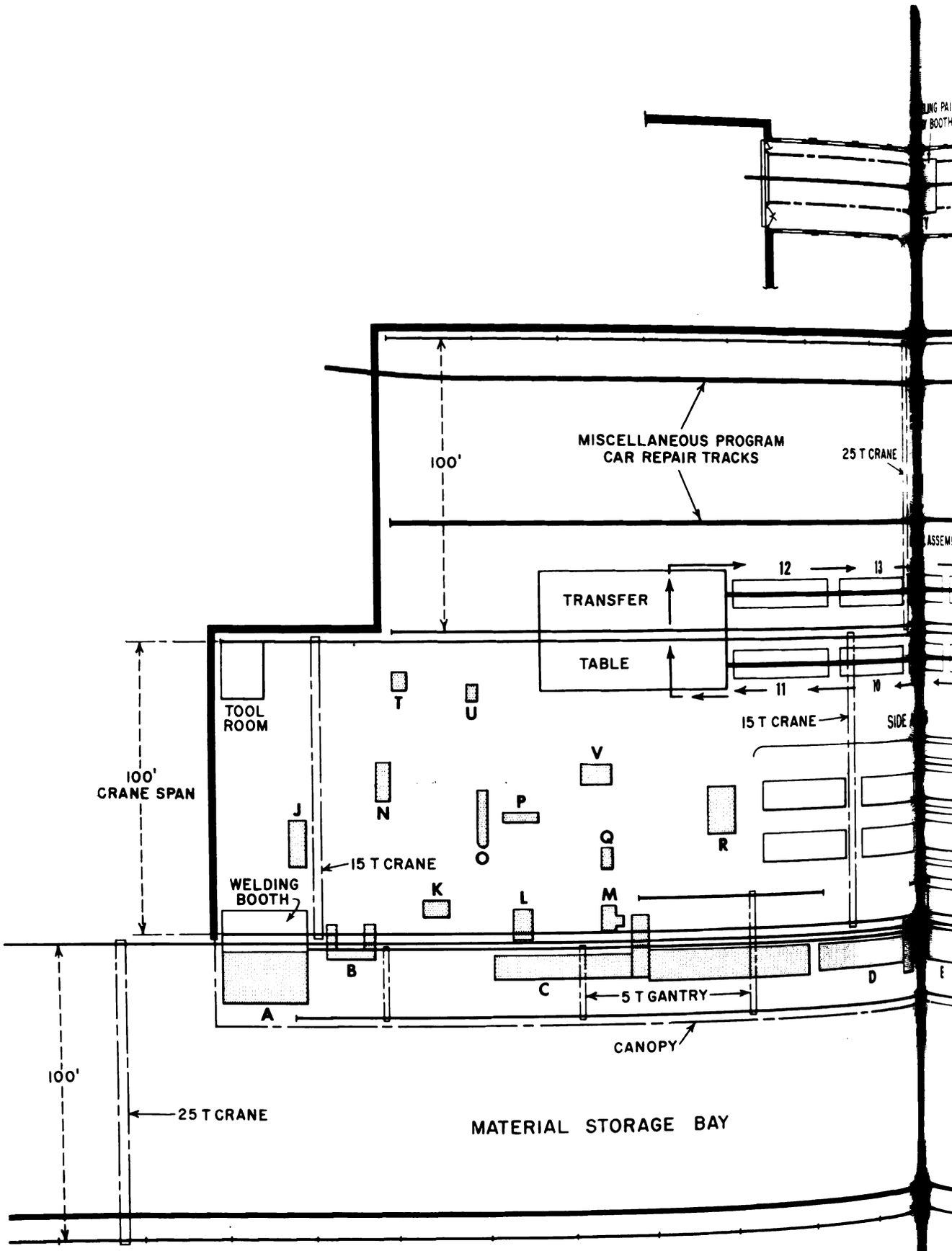
A few years ago the Norfolk & Western mechanical department was asked by management to project its new car and heavy car repair programs over a 10-year period. When this was done, it was found that the car shop at Roanoke, Va., did not have sufficient capacity to handle the work which could be anticipated. The result was management's decision to build a new car shop at Roanoke.

Construction of this shop is nearly completed. Production of new cars has been underway in the shop since late last year. It was necessary to locate the new shop on the same land that the former car shop had occupied, and this meant that the project involved the simultaneous dismantling of old structures and construction of new ones, and continued car production.

The shop consists of three parallel bays, each 600 ft or more long. Attached to the end of the last bay is a 450-ft, single track paint shop. The total area under roof is approximately 150,000 sq ft. In addition, there is approximately 45,000 sq ft of material storage area with overhead cranes but without a roof. The entire shop layout covers approximately 10 acres.

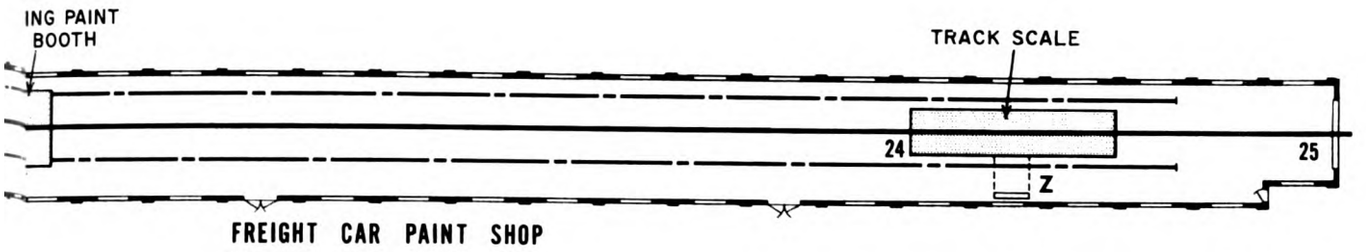
(*Continued on page* 24)

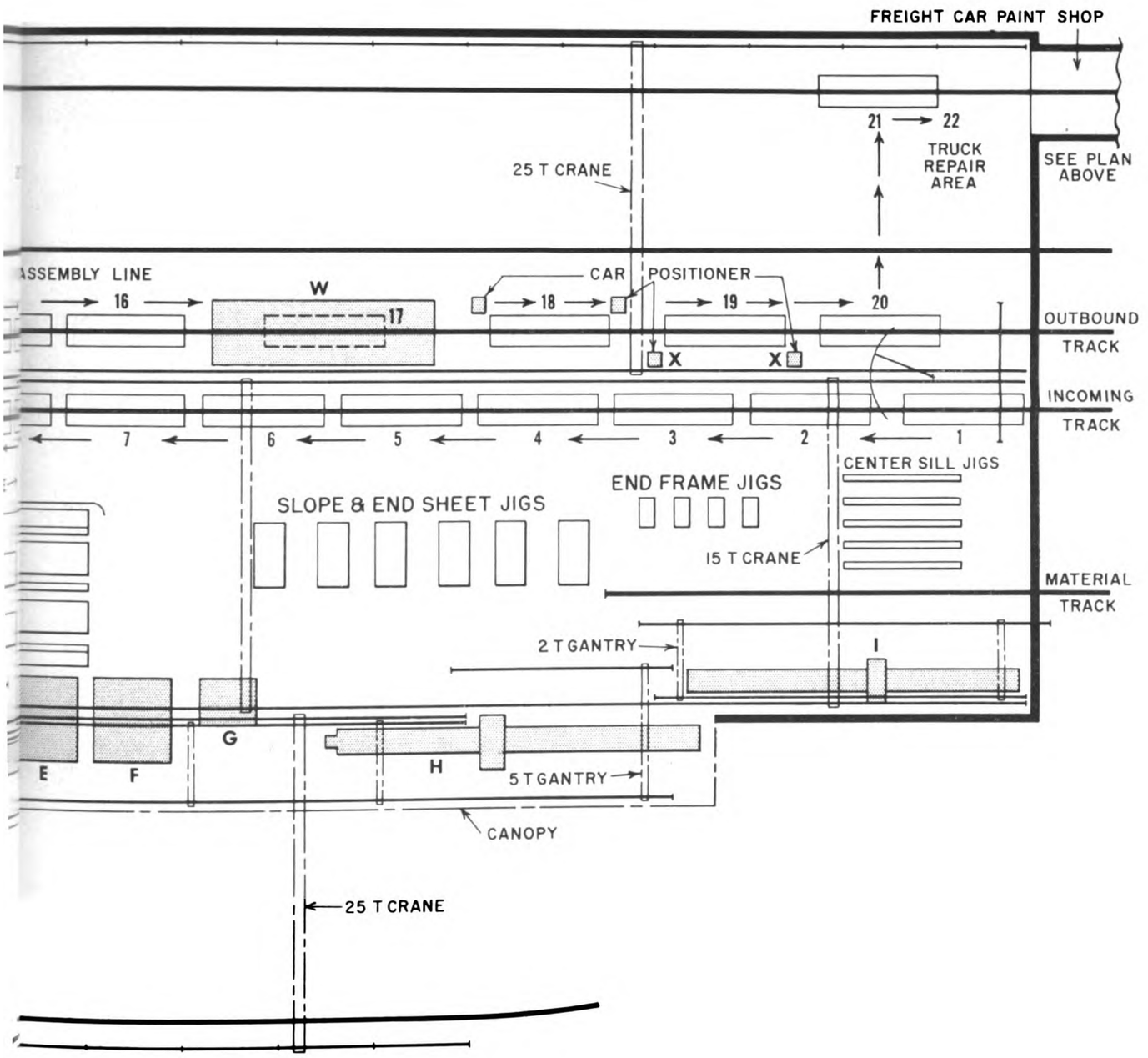
For Car Shop Plan and Details of the Job It Is Now Doing, Turn Page ►



IMPORTANT SHOP MACHINES

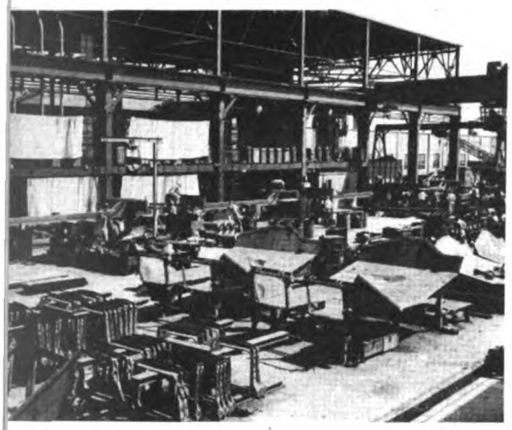
A Angle Shear—Hilles & Jones Co.
B Gate Shear—Hilles & Jones Co.
C 400-Ton Gap Punch—Hilles & Jones Co.
D 1,000-Ton Multiple Punch—Thomas M. M. Co.
E Oxweld Cutting Machine—Linde Co.
F Oxweld Cutting Machine—Linde Co.
G 600-Ton Press Brake—Cincinnati Shaper Co.
H 400-Ton Beam Punch—Thomas M. M. Co.
I 350-Ton Gap Punch—Hilles & Jones Co.
J Punch and Shear—Henry Pels & Co.
K Gate Shear—Long & Allstater Co.
L Horizontal Punch—Long & Allstater Co.
M Single-End Punch—Long & Allstater Co.
N 25-In. Beam Punch—Hilles & Jones Co.
O Punch & Shear—Long & Allstater Co.
P Single-End Punch & Shear—Wm. White Co.
Q Double-Head Punch & Shear—Wm. Sellers Co.
R 800-Ton Press Brake—Cincinnati Shaper Co.
T Rail Straightener Press—Hilles & Jones Co.
U Punch—New Doty Manufacturing Co.
V 250-Ton Hydraulic Press—Lake Erie Eng. Corp.
X Car Positioner—Pandjiris Weldment Co.
Y Traveling Paint Spray Booth—DeVilbiss Co.
Z Track Scale—Fairbanks, Morse & Co.





HOPPER CAR ASSEMBLY OPERATIONS

1 Place underframe assembly on temporary shop trucks. Ream.
2 Ream.
3 Drive diagonal braces, bolsters, body side-bearing supports, and end sills.
4 Apply end-post zees, AB valve, brake cylinder and reservoir. Drive gussets.
5 Apply draft gears, end-post zees, and end floor assemblies complete with door frames and hopper sheets.
6 Apply center assembly complete with cross rides and longitudinal hoods.
7 Drive draft gear retainers, and the center floor assembly. Fit longitudinal hoods to end floors. Apply hand brake.
8 Weld center area of car
9 Weld center area of car
10 Hang sides.
11 Ream sides.
12 Drive.
13 Drive.
14 Drive. Apply brake rod and train line. Apply hopper doors and fit up with hinges, locks and spreaders.
15 Drive hopper doors. Apply body brake levers, brake chain and rods.
16 Complete branch pipe and retainer application.
17 Shot blast exterior of sides.
18 Weld floors, sides, hoppers and top side angle (right side).
19 Weld floors, sides, hoppers and top side angle (left side).
20 Apply coupler, angle cocks, uncoupling levers and remove completed body from shop trucks.
21 Apply car cement to underbody and interior of body.
22 Place car on trucks and paint trucks.
23 Spray paint exterior of car.
24 Weigh and stencil.
25 Final inspection.



Production line starts (left) with placing of underframe assembly on shop trucks. Subassembly operations are located so as to feed their output directly into the assembly line where components are applied to cars. High cross ridges on the H-10 carstake the place of the cross-beams (center). Fabrication, subassembly and assembly operations in the new shop are covered with gantry, pedestal and or overhead traveling cranes. Side assembly tables (right) produce last major subassembly to be applied to the budding hopper car. Note that the walls of the fabrication shop in the background are corrugated glass from just above the floor to the roof.

The shop is equipped to construct or give heavy repairs to open-top, box, flat, and company service cars. Its capacity is 20 new or heavy repair cars per 8 hr day, while at the same time carrying on miscellaneous freight car repair work. The main shop consists of two 100-ft wide crane bays each 600 ft long, and one 660-ft crane bay also 100 ft wide. Over the 600-ft x 100-ft material storage bay are located two 25-ton overhead traveling cranes. In the center 660-ft x 100-ft fabricating and assembly bay are four 15-ton overhead traveling cranes. In the 600-ft x 100-ft assembly and repair shop are two 25-ton overhead cranes. Also there are eight 5-ton and two 2-ton traveling gantry cranes servicing heavy machine tools. Numerous pedestal and jib cranes are located throughout the shop area to serve specific fabricating and assembly operations. A 5-ton monorail hoist moves shop trucks back to the first assembly line position. The fabricating shop is equipped with machine tools of sufficient capacity to supply almost all of the fabricated material for new car and repair programs at this shop, as well as supplying car repair material for other N & W car repair operations.

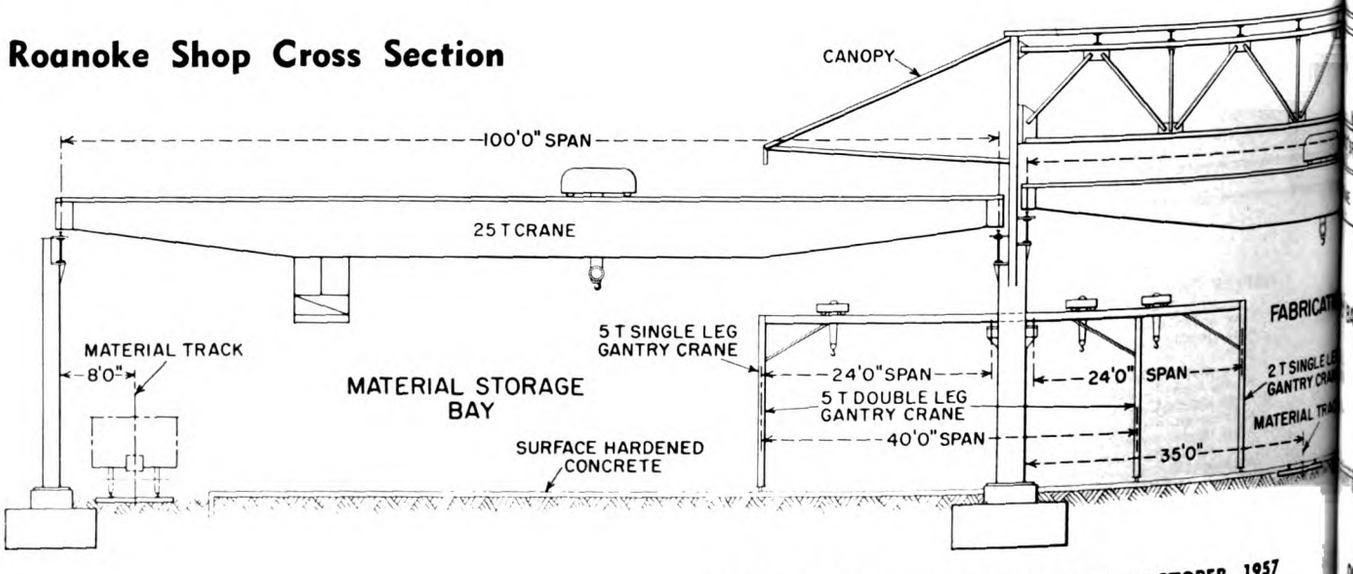
The 20-position assembly line consists of two parallel tracks, each 475 ft long, connected at one end by a 30-ton, 65-ft Whiting transfer table. Along the last half of this line is a 70-ft shot blast booth for cleaning rust and scale from cars, and two pairs of positioners for rotating car bodies to permit downhand welding. Seven car pullers are used for moving cars through the assembly line positions and through the paint shop.

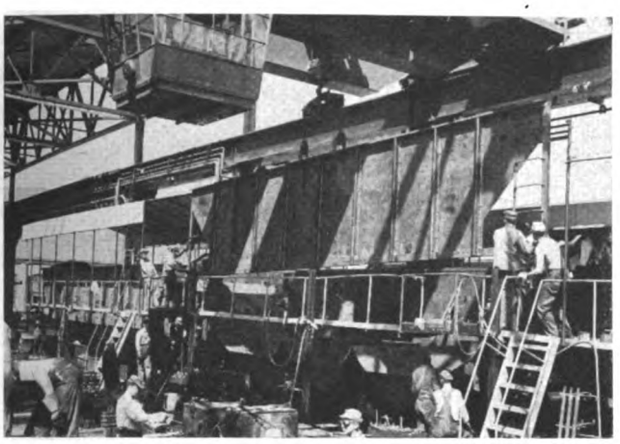
Paint Shop

The nine-position freight car paint shop is 31 ft wide and 450 ft long. It has a DeVilbiss traveling paint spray booth, a Fairbanks track scale for weighing cars, and facilities for car stencilling.

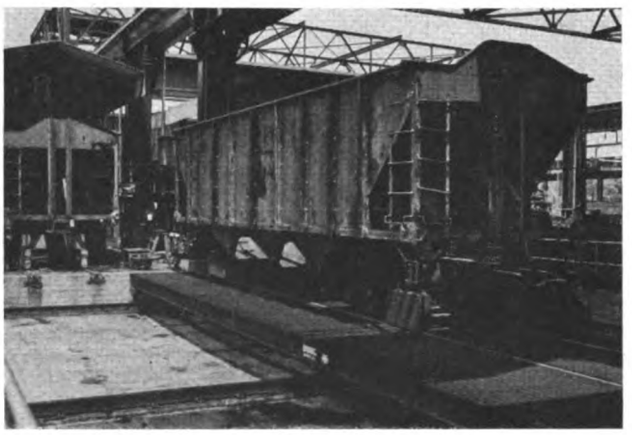
Modern wash rooms and locker facilities for 625 men are placed in a brick building with glass block windows, thermostatically-controlled unit heaters, and glazed-tile inside walls and shower stalls. All wash fountains are of stainless steel. Drinking fountains and toilet facilities are located throughout the shop area.

Roanoke Shop Cross Section





Side application is handled with one of the four 15-ton overhead cranes in the assembly and fabricating shop. N&W uses low-alloy, high-tensile steel for the sides, floor and hoppers.

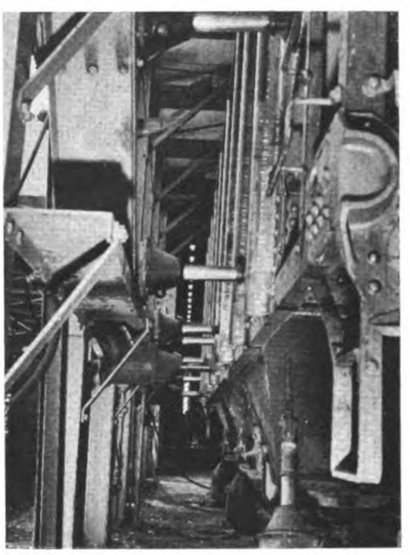


Ready for riveting, a completely reamed car moves oven on Whiting transfer table. Reverse flow on last half of the assembly line brings shop trucks back to initial assembly position for another car.

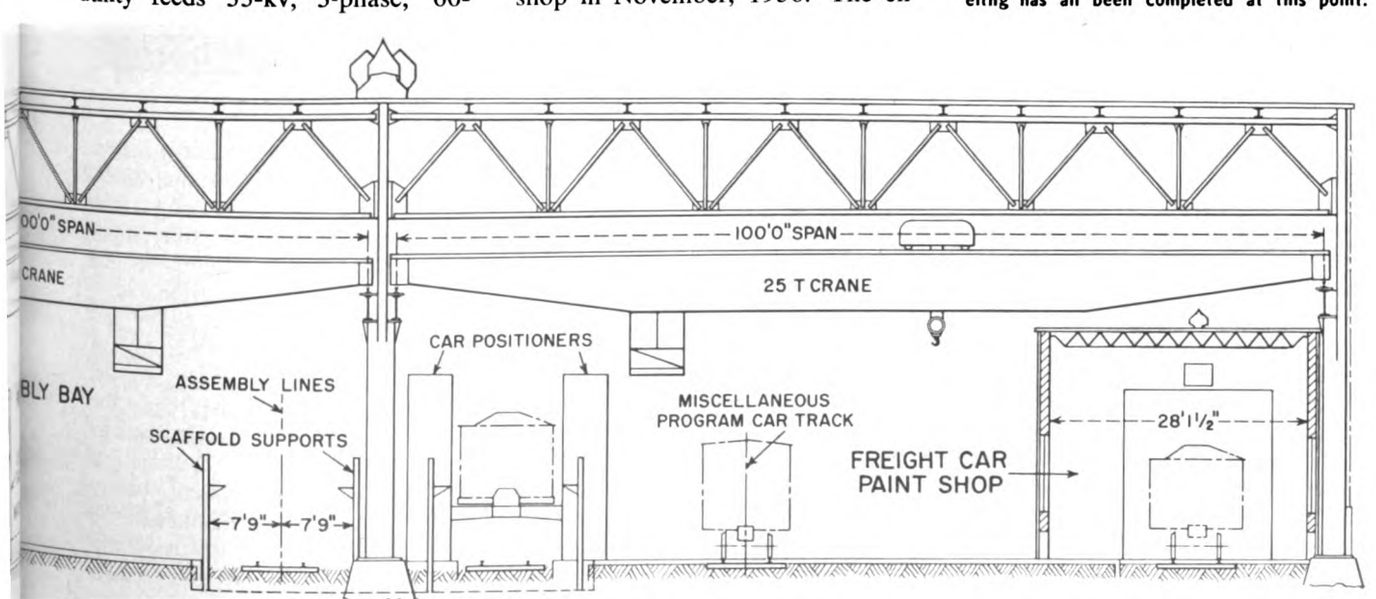
The main shop building has brick and corrugated actinic glass walls. The brick extends up 5½-ft above the foundation and the wire-reinforced corrugated glass extends up the remaining 40-ft to the eaves. The paint shop is a brick and concrete block structure with metal-sash windows and overhead rolling doors. The floor throughout the shops and in the material storage bay is a surface-hardened concrete. Car assembly tracks are lined with scaffold supports mounted on 15-ft centers, and these tracks are placed in gravel ballast filled and tamped flush with the shop floor.

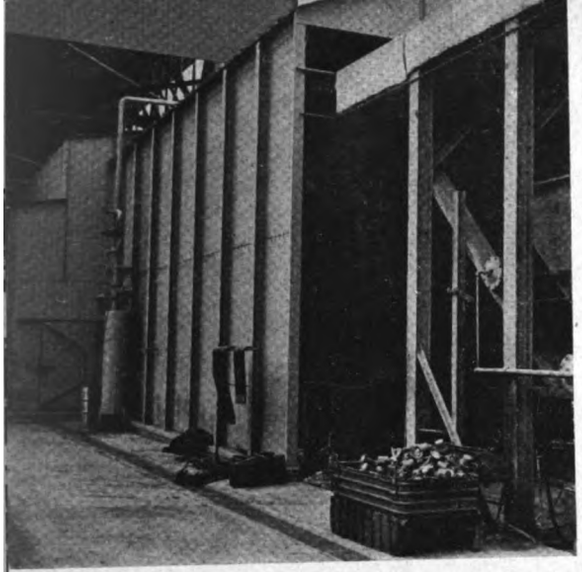
Piped into service outlets throughout the shop are oxygen, natural gas, acetylene, compressed air, steam and water. The local utility feeds 33-kv, 3-phase, 60-cycle power to a single-circuit unit substation where it is transformed to 4,160-v. Three 500-kva power centers, conveniently located at shop load centers, reduce the 4,160-v to 480-v for shop machinery and cranes. and 277-v for lighting. Distribution to the assembly lines is through Westinghouse plug-in bus duct. Overhead cranes are fed through General Electric Type TK trolley busways. Illumination is provided with high-efficiency industrial-type fluorescent fixtures. Individual welders are used throughout the shop. Both single phase straight a-c and three-phase rectifier types are used.

The plans for this shop, started in 1950, were completed in 1953. Construction started in 1955 and the first car was turned out of the shop in November, 1956. The en-

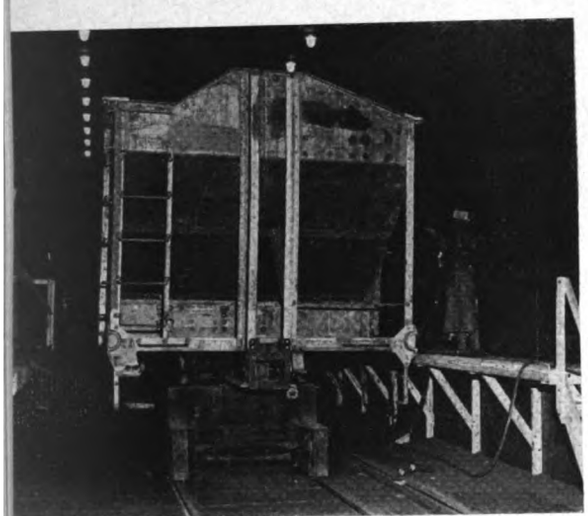


Air-cylinder clamping station holds sides and hopper floors in position so they can be accurately tacked prior to final welding. Riveitng has all been completed at this point.

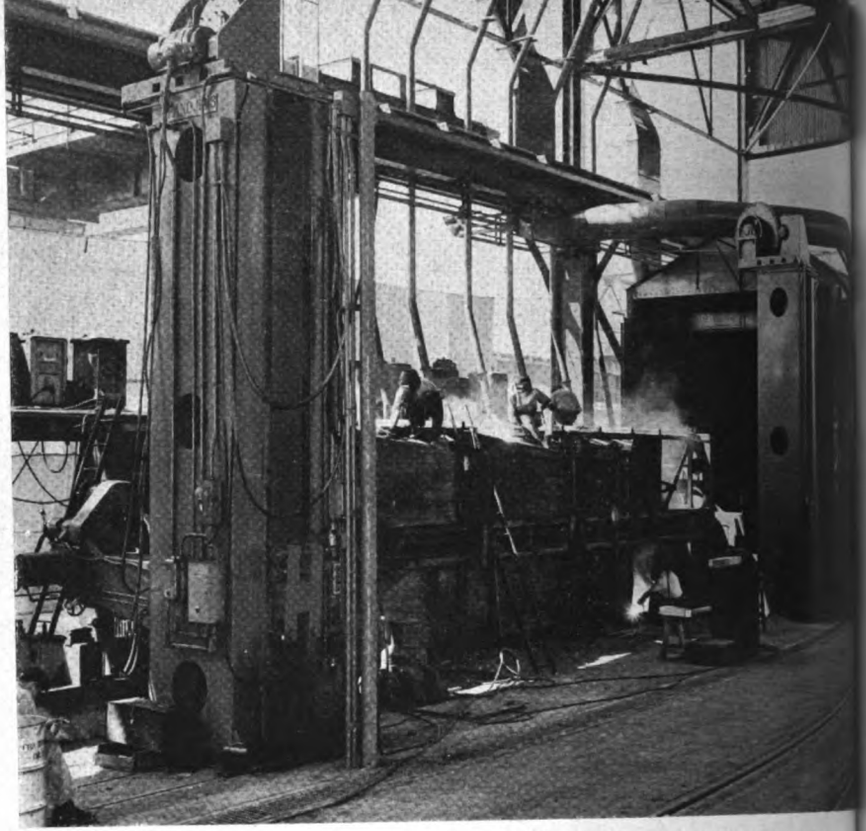




Shot-blast booth is 70-ft long. Completely riveted and tack welded car is cleaned in this Pangborn unit prior to going on down the line for finish welding, undercoating, and finally to the paint building.



Metal pellet cleaning of the outside and inside of the hopper body is completed rapidly in this Pangborn booth.



Two adjacent sets of Pandjiris welding positioners rotate the car to one side and then to the other so that all of the final hand and machine welding can be done in the downhand position. Shot-blast booth is to the right and the initial assembly line positions are just beyond the top of the rotated car in the positioner.

Truck assembly position has side frames feeding in on sloped rack over wheel sets. Bolster assembly is back of crane pedestal. Trucks are moved over to next track leading to paint building before body goes on them.

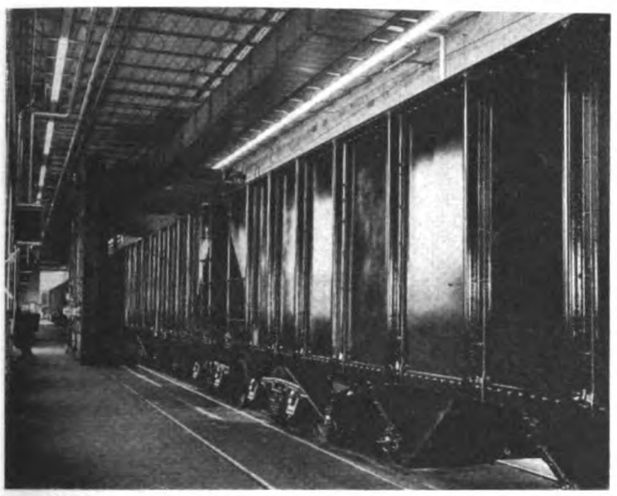
tire facility will be completed during 1958.

The N&W owns approximately 51,000 open-top cars, 10,000 box cars and 2,000 other cars of various types. It is to protect this investment and to provide additional car capacity that the new shop has been built. Protecting such an investment by proper maintenance is tremendously important for the successful operation of the N&W. Unlike many railroads, three cars out of every four that the N&W handles are its own equipment loaded on its own lines. Since most of its cars are at home most of the time, this does simplify some maintenance problems, according to N&W officers, but does not solve them automatically.

Repair Program

It is the N&W policy in coal-car maintenance to build or buy a group of new cars, operate them until running repair costs become excessive, and then call in the entire group for heavy repair. The thing which normally limits the usefulness of open-top cars in coal service is corrosion of body sheets. Down through the years, the N&W utilized first copper-bearing steel, and more recently low-alloy high-tensile steel, as solutions to the problems of body corrosion.

Usually the N&W's heavy repairs involve the application of complete new body sheets to the car's underframe. It has been the road's finding that most underframes are capable of having one additional body applied before corrosion has so damaged the underframe that it is not economical to continue this type of repair.



DeVilbiss traveling booth uses DuPont steam spray application method. Cars are undercoated in the car shop prior to coming into this 450-ft paint building where they get the single coat of direct-to-metal paint.

Weighing and stencilling are completed inside the paint building. Note that rails for paint spray booth extend down past this Fairbanks-Morse scale along with the continuous exhaust duct on the shop ceiling.

According to C. S. Patton, assistant superintendent motive power —car, "If railroad cars are to be given this type of repair . . . it is absolutely essential that adequate facilities are provided so that the job may be done economically. The average shop track for running repair, or rip track, is definitely no place to do a program job involving extensive fabrication, subassembly and assembly work."

On a still larger scale, the studies by the N&W's mechanical department led to the decision that the N&W could not do without the new Roanoke car shop. It is turning out 20 new cars a day and soon will be turning out some heavy repair cars too. Roanoke shop is meeting coal boom's increasing pace.

What's New About the H-10?

Appropriately, the first cars to be produced at the Roanoke shop were for the road's coal traffic. One unique feature about the 5,500 Norfolk & Western 70-ton, H-10 hoppers now built or authorized is the double slope in the end floor sheets of the car. The N&W has experienced difficulty with bulging of the vertical end sheets in its older hoppers. Attempts to correct this with additional end posts have not been completely successful, and one aim in the design for these new cars was to cut the end sheet height.

To keep the overall car length, height and capacity the same as those of earlier models while reducing the end-sheet height, the inside width was increased and the double slope was put in the floors. The floor runs at an angle of 45 deg from the end sheet to the top of the bolster (actually end sheet and upper floor are one piece), and then at the standard 30 deg from that point to the hopper opening.

An innovation in these cars is the absence of diaphragms. The N&W is relying entirely upon the high, stiff cross ridges to carry the structural loads which normally are carried through diaphragm web plates.

Another unique structural detail is the gusset plates on top of the center sill under each of the cross ridges and between the bolsters and end floor sheets. These gussets are welded in place and resist in shear loads resulting from the acceleration of the car body during impacts.

The N&W uses a continuous side sill angle from end to end of the car, a 5 x 3½ x ½-in. angle. Center sills are 41.2 lb AAR Z-sections and the bolsters are fabricated from 95-lb 20-in. I-beams. The N&W uses cast steel side braces, and has designed a special steel corner casting which serves as a connection between the side sill, end sill, corner post and diagonal brace while simultaneously providing an uncoupling lever bracket. All of these cars are being equipped with

journal lubricators and multiple wear wrought steel wheels.

The N&W uses low-alloy, high-tensile steel for all of the H-10 body sheets which contact the lading.

For the present the N&W is building a car which is designed to stand up under a growing coal traffic. Two of the early cars were tested at the Technical Center of the National Malleable & Steel Castings Co. in Cleveland. No major design changes have had to be made based on these tests and the cars are proving entirely satisfactory in service.

N&W Duplicated Capacity of Previous 70-Ton Cars

BUILT	H2a 1949-1956	H10 1956-1957
Capacity level full, cu ft	2460.	2460.
Length over strikers, ft-in.	38-2	38-2
Length inside body, ft-in.	36-9¾	36-9¾
Height over end sheets, ft-in.	12-3	12-3
Height over side angles, ft-in.	11-0	11-0
Width, inside, ft-in.	9-6	9-10
Width over side angles, ft-in.	10-3¼	10-7¼
Weight, light, lb	52,700	52,600

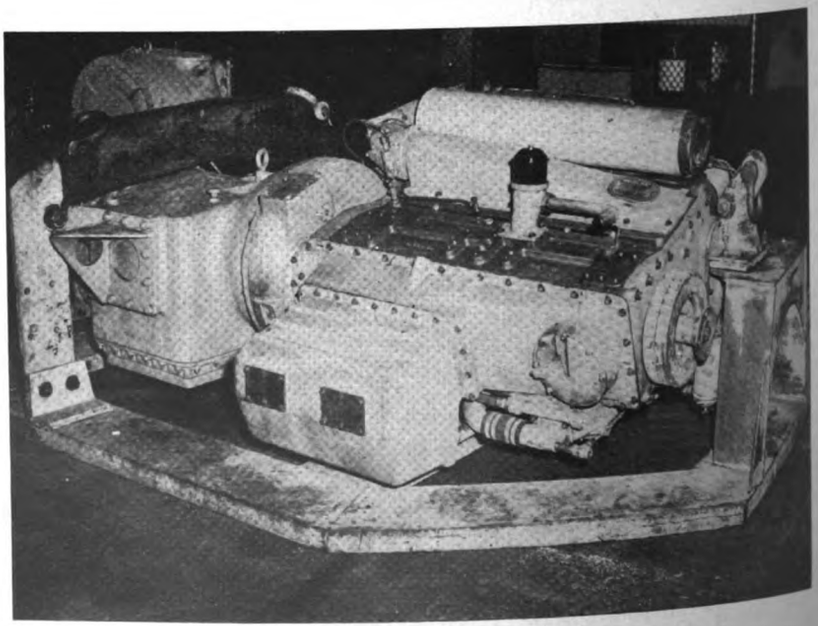
Over 600,000 car miles per month are operated with Budd RDC's on the B&M. Suburban service, local hauls, and long-distance runs are all assignments for these versatile cars. B&M uses from one to eight cars in a single consist.

Engine Overhauls for Largest RDC Fleet

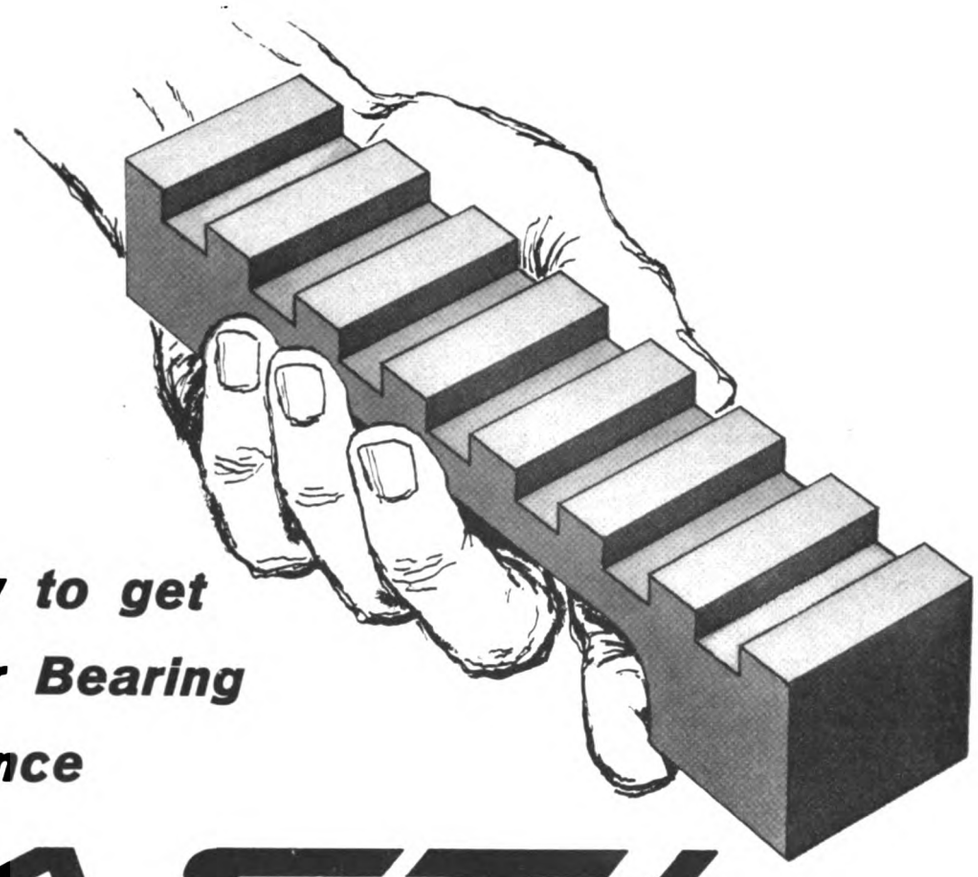
Boston & Maine has tooled its diesel shop to repair the power plants for 103 cars.

Repairs and rebuilding for the GM engines and transmissions of the world's largest RDC fleet are being handled at the Billerica shop of the Boston & Maine. The B&M is the undisputed leader in RDC ownership with nearly a third of all the rail diesel cars which Budd has ever built. B&M's 103 units totals more than twice the number owned by any other single railroad.

Billerica is located over 20 miles northwest of Boston and a section of this diesel back shop specializes on Budd engines. Most of the servicing and running repairs for this large fleet of rail diesel cars is handled in the engine house at Boston. This terminal also charges out the



Engine shipping and assembly stand developed by the B&M is used for transportation between the back shop and running repair terminals. Frame of stand is rugged, and the engine is mounted in it the same way it is suspended under the car body.



Surest way to get Better Bearing Performance

FAST!

Railroads have accumulated 30,000 car-months of service with R-S JOURNAL STOPS — and have averaged better than 6,000,000 car-miles per set-out

MAGNUS R-S Journal Stops, bolted to the inside of the box, on either side of the journal, positively prevent excessive axle displacement even under the severest road or switching impacts. All elements of the bearing assembly are kept *in place, all the time!* You maintain a constant hydrodynamic oil film that guarantees optimum journal bearing performance.

Magnus R-S Journal Stops are now installed on more than 2,600 cars which have accumulated more than 30,000 car months of service. In this time there have been only six road failures. That's equivalent to better than 6,000,000 car miles between set-outs. You can't beat that kind of performance with any other type of freight car bearing — or any other journal bearing device.

For full information on R-S Journal Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

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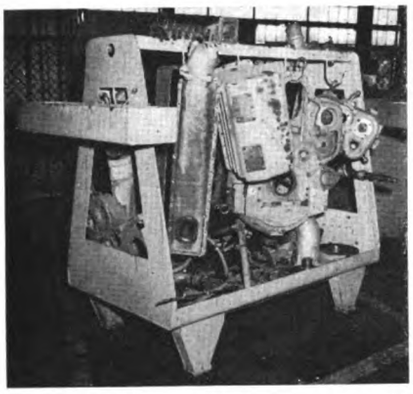
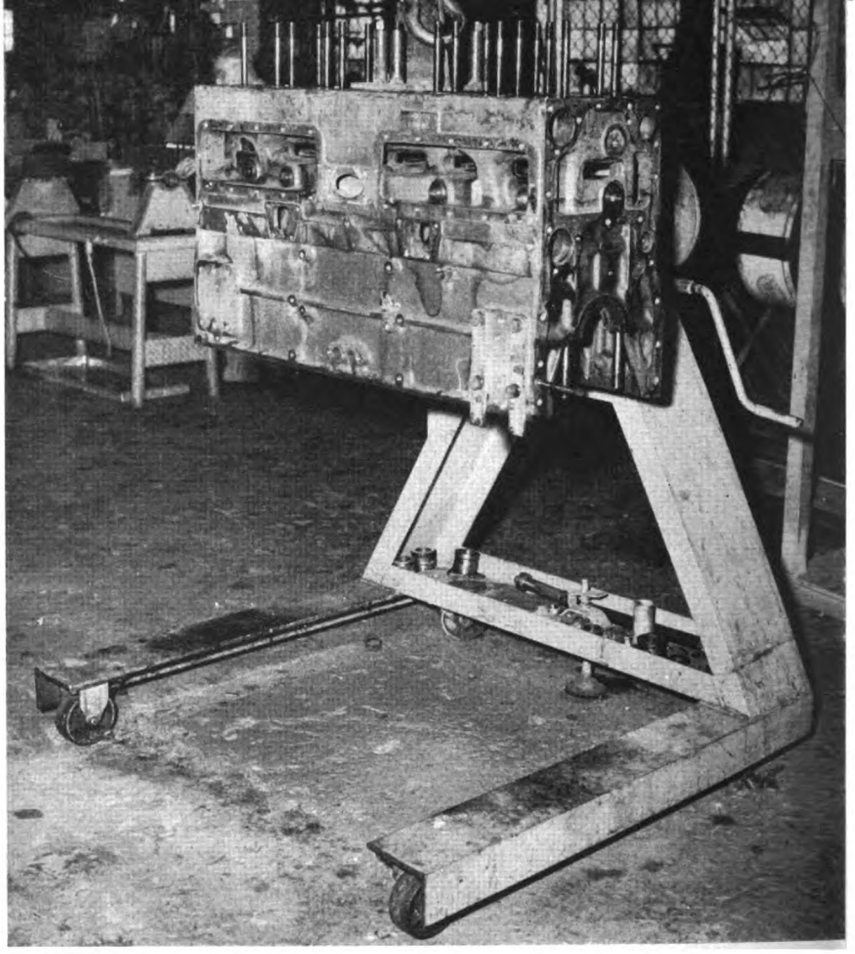
Solid Bearings

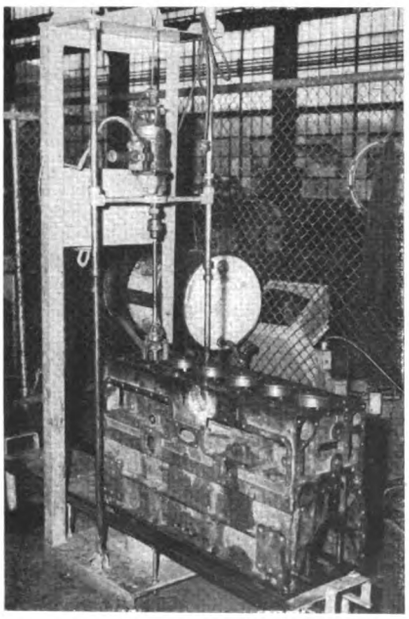
MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

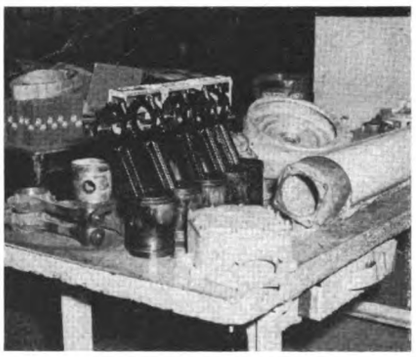


Rack for holding disassembled engine parts is moved to diesel shop cleaning tank and parts remain on it while being cleaned. B&M generally assembles the same group of parts when rebuilding an engine. After cleaning parts are inspected closely.



→ Detroit engine block has been placed on a crank-operated positioner for reassembly of an engine. Engines are torn down on the same stand. B&M has seven-compartment trays for segregating the bolts and other fasteners from different parts of the engine.





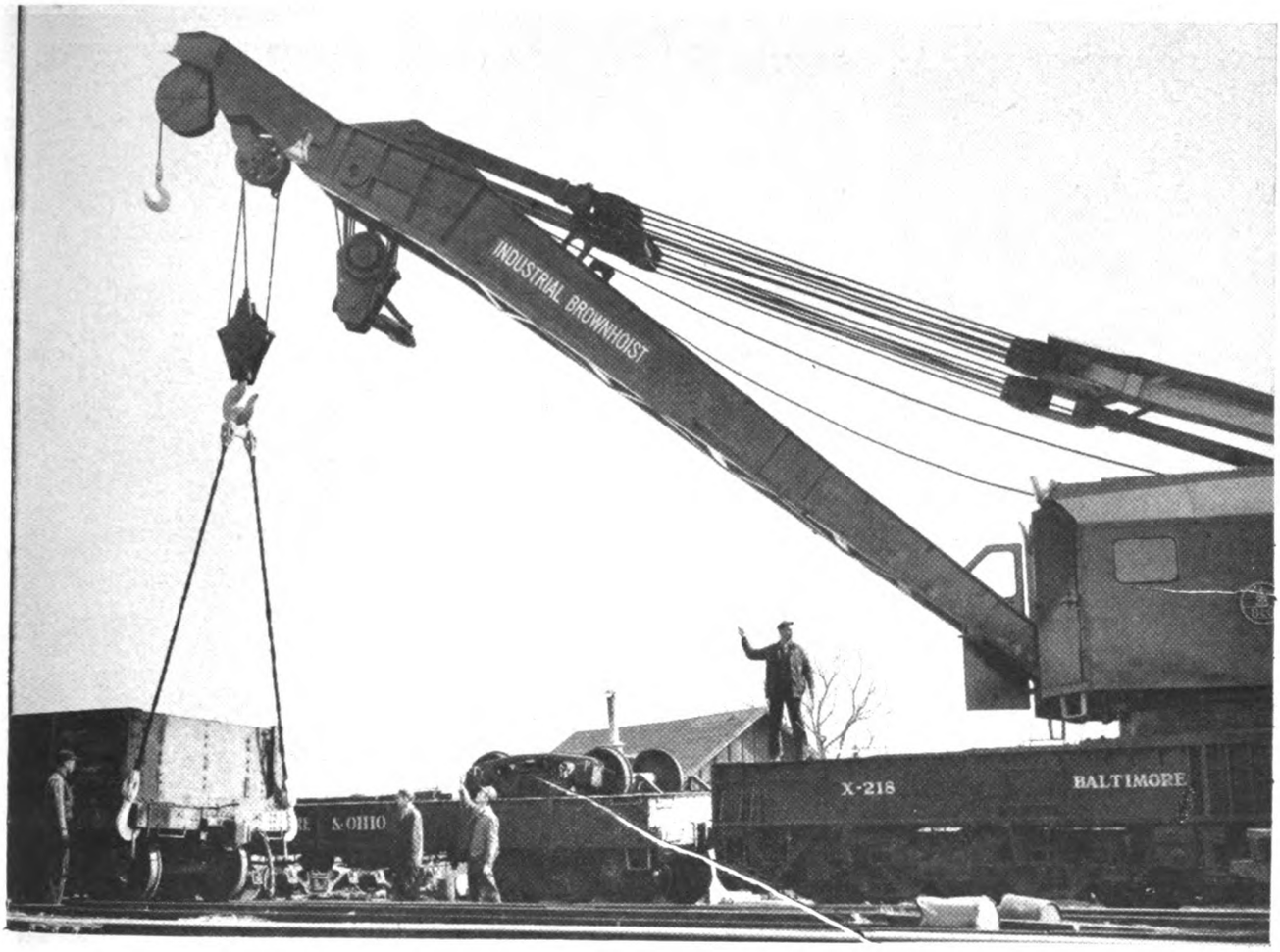
Honing stand (left) for diesel engine block has been arranged so that this operation need no longer be done by hand. The B&M performs some welding and brazing repairs on major components such as this; other times sends them out for such work. Engine parts (center) such as pistons and crankshafts are subject to Zyglow inspection before being returned to service. Most smaller and less expensive engine components are scrapped rather than being reclaimed for further use. On the stand (right) the engine cylinder head is completely assembled with its valves and other components prior to application to the block. Tank at the left is used to make water passage leakage tests after blanking plates have been applied to passages.

power plants and sends them to Billerica for necessary work. The B&M RDC fleet is composed of fifty-six RDC-1's, fourteen RDC-2's, three RDC-3's and thirty RDC-9's. These RDC-9's are single engine cars without engineman's controls and with windowless vestibule ends. The B&M is the only road to operate the RDC-9 type of car. This entire fleet requires 176 engines in actual service and 12 others maintained as spares.

Through the years the B&M has been successful in keeping repair costs low. During 1956 the nine cars purchased in 1952-1953 were costing $.210 per mile for repairs, the sixty-one 1955 cars averaged $.102 per mile and thirty-three 1956 cars (mostly RDC-9's) were being repaired for $.046. This meant that the entire fleet had an average repair cost figure of $.11 per mile.

Power plant mileage between heavy repairs has varied from about 100,000 miles to over 200,000 miles, which design changes are expected to increase still more. Heavy power plant repairs were accomplished at an average cost of $2,514.93 per engine last year.

The B&M has been installing and building equipment at Billerica shops which has been a big factor in keeping down the costs of engine overhauls and also has assured the satisfactory performance of these power plants when they are again installed under cars. A large number of jigs and racks have been built for specialized operations,



Big Load...Easy Lift

for Yellow Strand Braided Safety Slings

Here's why Yellow Strand Braided Safety Slings make it easier to lift big loads:

They're unusually flexible – can be installed and removed more easily . . . resist kinks and twisting. They're strong – are made by a special Broderick & Bascom braiding process with proved, dependable Yellow Strand Wire Rope.

They provide maximum safety – safeguard employees, loads and equipment.

They're available for any load – for the routine lifts, unusual shape or size loads, extra heavy loads. Yellow Strand Slings can be specifically engineered for your individual needs.

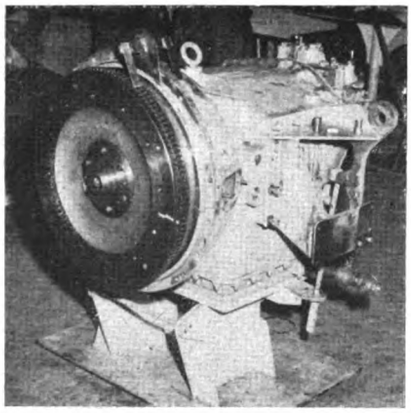
Broderick & Bascom engineers will be glad to assist you with your sling problems.

Yellow Strand®

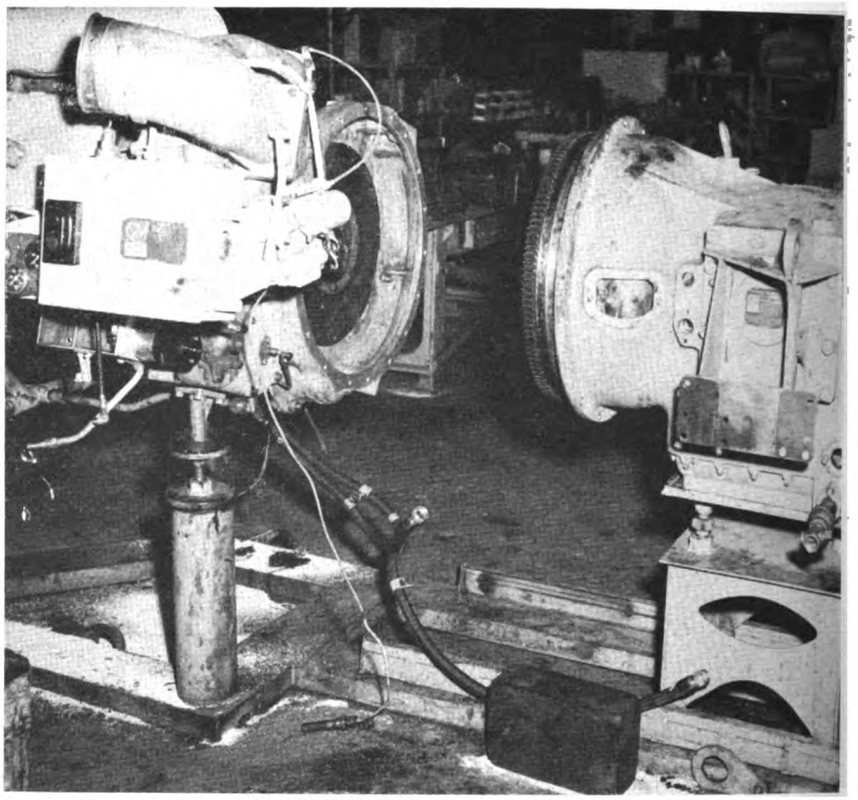
BRODERICK & BASCOM ROPE CO.

Manufacturers of Wire Rope for over 80 Years

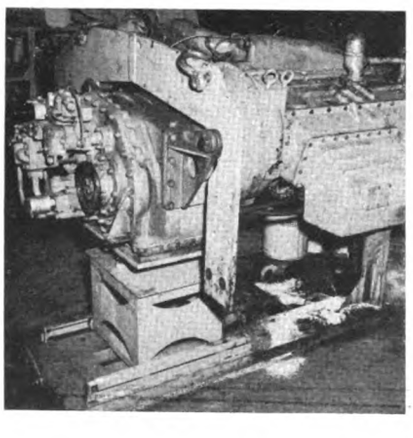
4203 Union Blvd., St. Louis 15, Mo.

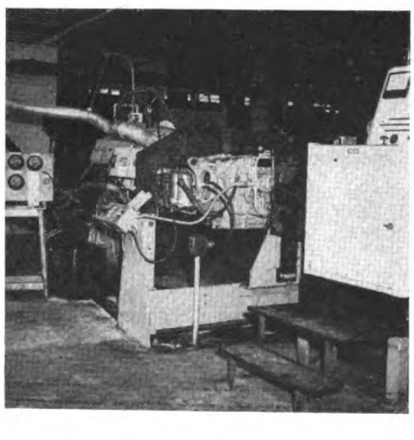


Transmission on assembly stand can be worked readily. B&M has recently acquired a Heli-arc welding outfit for repair of transmission housings and engine oil pans sometimes damaged when cars run over objects such as fallen rocks.



Stand (right) for removal and application of transmissions makes possible rapid alignment and simplifies assembly and disassembly procedures. Note (below) that the yoke from the shipping stand has already been applied to assist in moving the complete engine to the dynamometer.





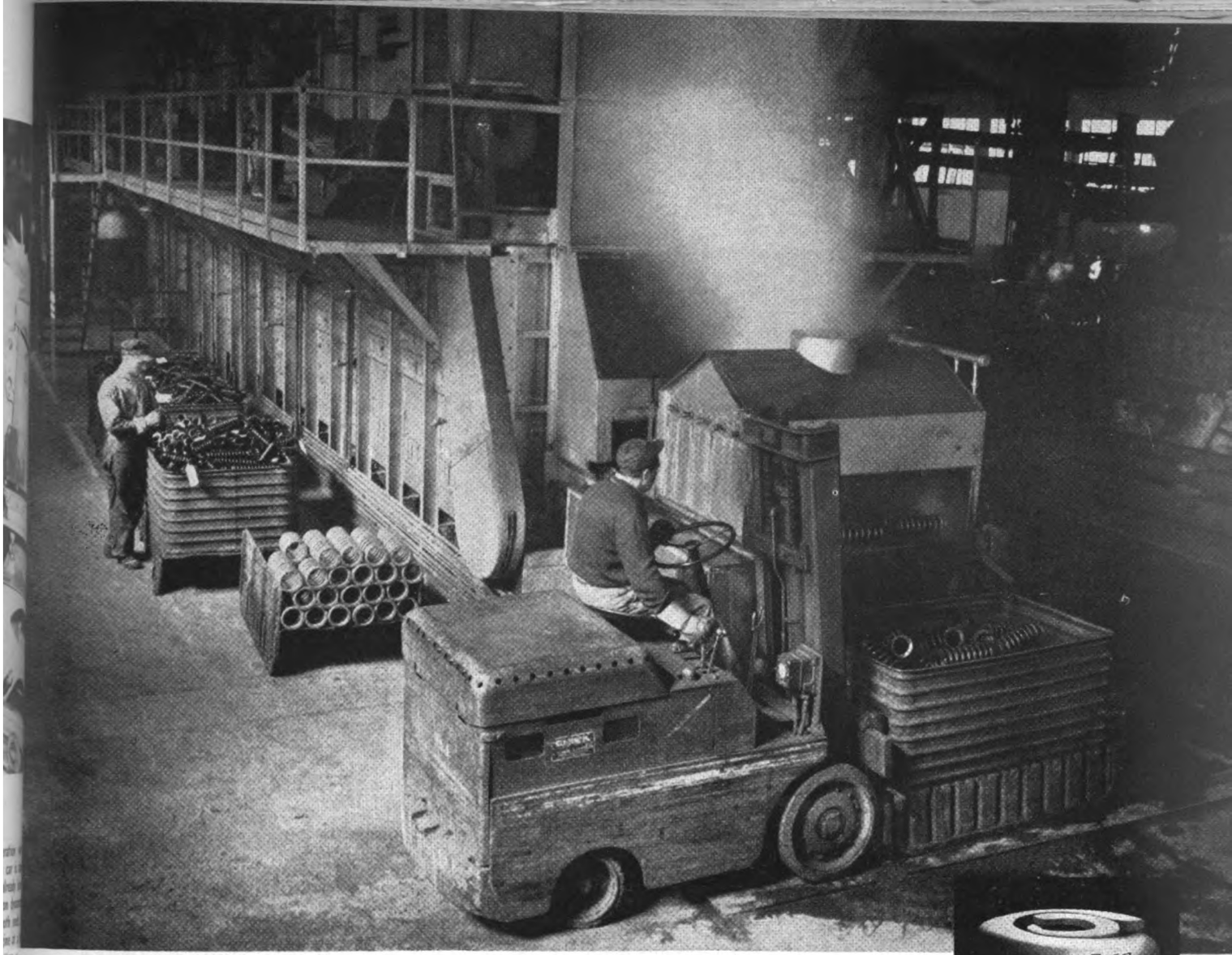
◄ Satisfactory engine operation when power plant is placed under a car is assured because the engine has already been run in on this test stand. Clayton dynamometer has Spicer shafts out of both ends, but only capacity to test one engine at a time. This arrangement permits "setting up" a second engine so that the testing can be continuous. Flexible, water and exhaust connections are conveniently located. A standard RDC air cleaner is mounted on a stand and can be wheeled up to the test block. From the portable gauge board the following readings are taken: water temperature in, water temperature out, transmission temperature, exhaust temperature, engine oil pressure, air box pressure, crankcase pressure, and engine speed.

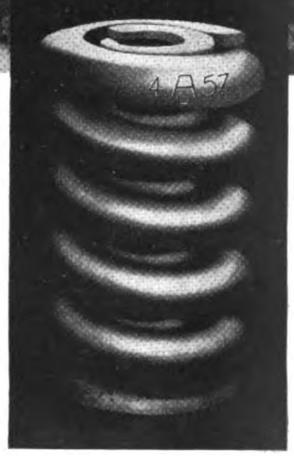
many designed by shop superintendent E. C. Cone and by RDC foreman J. E. Manne. The railroad has installed a Clayton dynamometer which makes it possible to completely load test the engine and transmission prior to shipment. This load tester is capable of absorbing 300 hp. The diesel governor room at the shop also handles Budd engine governors. Some components are sent out for reclamation and many others are automatically renewed when the engine is torn down. At times the shop has had to turn out as many as 20 light and heavy power plant overhauls in a week.

Today the RDC's are producing over 90 per cent of the B&M's passenger train miles. Their ability to do this is, in part, a reflection of the confidence which the operating department has in their reliability. Scheduling for high utilization must depend on a minimum of road failures and maximum availability. Running maintenance and servicing by various B&M terminals, along wtih the work done by Billerica shop is a big factor in these operating results.

MAJOR ITEMS OF EQUIPMENT AT B&M's BILLERICA RDC ENGINE SHOP

- 4 Engine block positioners for assembly and disassembly
- 2 Cylinder head assembly stands
- 1 Water tank for cylinder head testing
- 1 Deep freeze for valve inserts and transmission parts
- 1 Hot oil tank for expanding parts
- 1 Engine stripping stand
- 2 Engine assembly stands
- 1 Boring bar
- 1 Honing fixture
- 1 Dynamomter
- 3 Engine test stands
- 10 Rack-skids for holding disassembled engine parts





.CO FREIGHT CAR TRUCK SPRINGS GUARANTEED FOR 10 YEARS

orm quality ALCO guaranteed springs are made to exceed AAR speci-ions; now you get even greater protection against replacement need.

ilroads around the world, ALCO springs have proved themselves again and . They are so time-honored, ALCO can afford to guarantee these freight car springs against breakage for at least ten years.

ALCO FREIGHT CAR SPRING has date of manufacture stamped on coil. If it breaks within a period of ten years from that date, a new spring will be furnished free of charge by ALCO.

This ALCO guarantee applies to these springs*: (Standard AAR Designs)

1. 2½-in. travel
2. 3 1/16-in. travel
3. 3 11/16-in. travel
4. 1915-D
5. 1936-D-2

*Except springs for brine refrigerator cars.

· ALCO guaranteed freight car springs for your next requirements. You will sured of top quality and superior service by one of the nation's largest railroad iers. Call your nearest ALCO Sales Representative or write Spring & Forge ion, Dept. SGR-3, P. O. Box 1065, Schenectady 1, New York.

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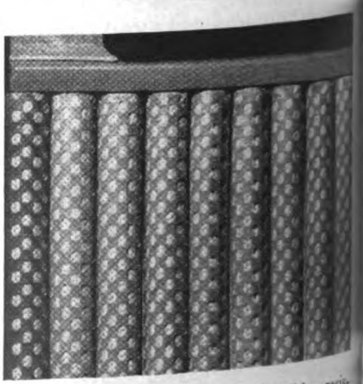
otives · *Diesel Engines* · *Nuclear Reactors* · *Heat Exchangers* · *Springs* · *Steel Pipe* · *Forgings* · *Weldments* · *Oil-Field Equipment*

EXIDE DEVELOPS NEW, IMPROVED, MORE

Photo courtesy Reading Railroad

New MGD Exide-Ironclad Battery for diesel locomotives. Designed to conform with recommended practices of Association of American Railroads.

ADVANCED TUBULAR CONSTRUCTION— DEVELOPED OUT OF RESEARCH STARTED 15 YEARS AGO



Armored porous tubing. Provides resistance to shedding and effects of vibration, improved flexibility, and maximum retention of active material. Thousands of tiny openings mean . . .

ED ONOMICAL DIESEL LOCOMOTIVE BATTERY

New MGD Exide-Ironclad Battery design unlocks more power from attery space—gives you increased savings on investment and operations

Exide-Ironclad diesel locomotive batteries are r than they ever were. Always famous for long d high performance, now they offer improve- that mean even higher capacity per dollar.

has achieved these new benefits for diesel loco- users by taking full advantage of the extremely ermeability of the armored porous tubing and its ved active material retention characteristics. This permeable tubing, made of braided glass fibers a perforated polyvinyl chloride armor, acts like a efficient filter, preventing practically any loss or ng of active material. Yet the high porosity en- contact between electrolyte and active material—antly improving battery performance.

you benefit

w MGD battery packs more power per plate than diesel locomotive batteries. It gives you a 50% in- in amperes discharged at diesel engine cranking ven over previous model Exide-Ironclad Batteries.

MGD is available in two sizes: 280 and 420 e-hours at the 8-hour discharge rate. In both, ntration of battery power reduces the space re- . The MGD-19 (420 ah capacity) battery nor- used in large road locomotives is now available the dimensions of batteries furnished in smaller ing locomotives without sacrifice in cranking, standby performance and life. This means new versatility and the possibility of reducing the number of sizes of batteries needed.

Same Exide-Ironclad quality features

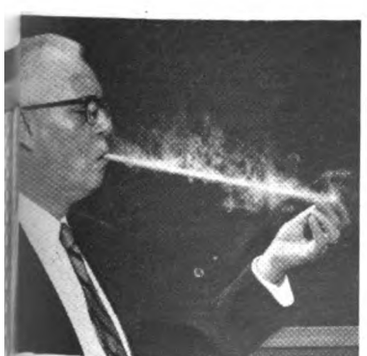
With all these improvements and new battery economies, you still get the quality features that contribute so much to the proven performance of Exide-Ironclad Batteries: heavy copper inserts in terminal posts and cell connectors to insure high sustained voltage during cranking; large electrolyte reservoir above plates to reduce watering requirements; ample sediment space in bottom of jar for long life; rugged molded rubber container built to withstand locomotive operation and provide for reduced maintenance.

Discover how much you can save

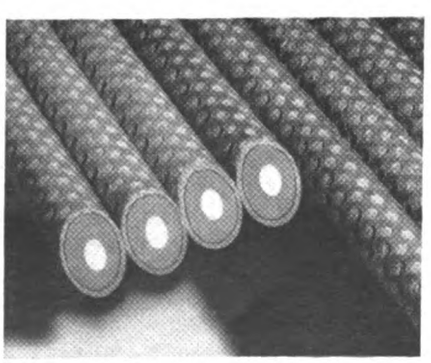
Learn how much you can benefit from the advantages this battery offers. Call your nearby Exide representative. Or write for complete information. Dept. MG, Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

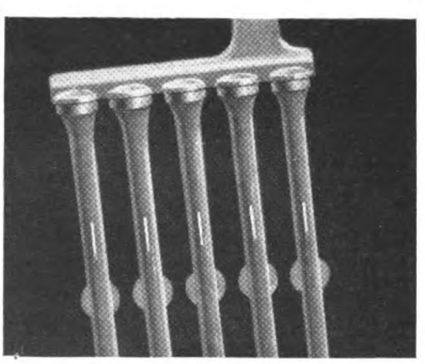
THE ELECTRIC STORAGE BATTERY COMPANY



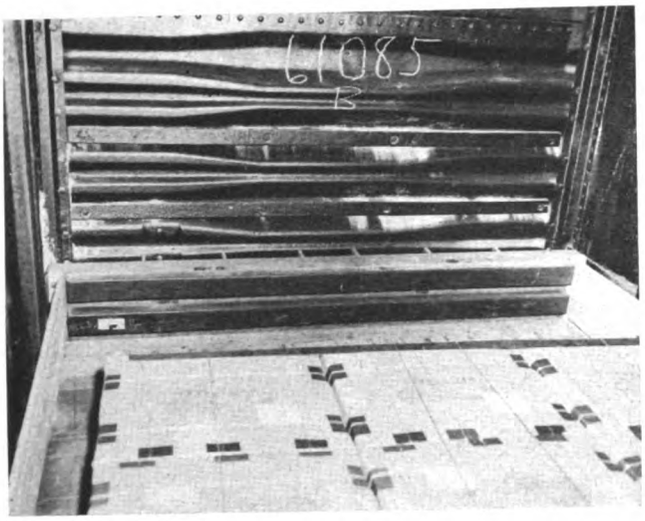
porosity. Highly permeable tubes rent flow, reduce internal resistance, access of electrolyte for superior ance under heavy loads. Each plate more power. Tubes hold . . .

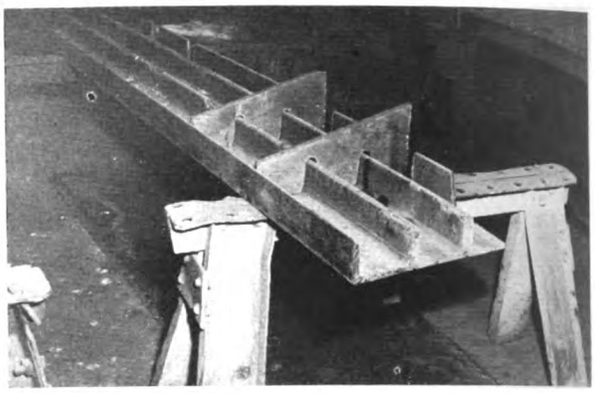


More active material. Chief source of battery power. Larger inside diameter of tubes means every positive plate contains more active material per cubic inch of plate. You get all this . . .



Plus Silvium,* Exide's patented grid alloy—proved more corrosion resistant than any other grid alloy. Tests prove conclusively that Silvium prolongs battery life.
**U.S. Patent*





Floating unit palletized load does float! Rubber bumpers (left) tied in with bulkheads and side lining protect edges of tin plate from crushing. Gussets (above) are formed and welded to channels to make a one-piece structure.

Rubber Bumpers Absorb Shock In . . . .

EJ&E's Newly Developed Box Cars for Tin Plate Traffic

Some 500 50-ton box cars, built in 1948, are now going through the East Joliet shops of the EJ&E under a planned heavy repair program. Two hundred fifty of these cars will be equipped to handle sheared and coiled palletized tin plate. The railroad serves as origin line carrier to three major producers and shippers of this commodity. To date, more than 200 cars are in this service, assigned to the Chicago switching district and Milwaukee area.

The tin-plate car program was started in January of this year, with an output now of five per day. The unique features of the cars consist of three 6-in. channels welded to form an 18-in. high by 9-ft, 7½-in. bulkhead in each end. Each bulkhead is braced by six ¾-in. by 7½-in. by 17¼-in. gussets, welded to it and attached to the end sill. At the end of each bulkhead is a side sill, side post and bulkhead channel connection gusset, ⅜ in. by 17 in. by 32½ in., providing a firm support to the partial lining brace.

Attached to each bulkhead are two 3½-in. by 4½-in. by 9-ft Goodyear rubber bumpers, the lower one located 2¾-in. above the floor line, with 2½-in. space between it and the upper bumper. Each bumper has a 1-in. centrally cored hole running the entire length and is drilled at four places for ½-in. by 2½-in. bolts, the heads of which bear against a piece of 1-in. half-round placed in the cored hole. The bulkheads are located 11 in. from the ends of car, providing a cushion for the load without damage to the car end, and also a surface to load against.

Altered After Tests

In the repair operation, the flooring and siding was removed from the cars prior to incorporating several special features required because of yard and road tests. The tests were based on various combinations of palletized packaged and varying sizes and weights of palletized coiled tin plate. General Steel Castings one-piece combination bolster, center plate and draft sill end castings are applied for greater strength and dissipation of shock. Tongue and groove oak flooring, 2¼ in. thick is used, this being ½ in. thicker than previous flooring. It was necessary to weld a ½-in. by 1-in. steel strip in the doorways to compensate for the increased height. The floor plates, which cover a 10 ft length at the doorways, were reapplied to facilitate use of heavier loading equipment.

Three types of rubber draft gear are used, together with new yokes and straight shank couplers. Tongue-and-groove yellow pine side lining extends 18 in. above floor, butting against the bulkheads and edges of rubber bumpers, providing protection to side of unit loads. To eliminate condensation, the interior of car is painted with Milar smooth cement.

These cars are a result of several months study of tin plate load behavior, built to encourage shippers and users of tin plate to continue to specify railroad handling. J. Losick, freight service engineer of the EJ&E, was assigned to coordinate the efforts of shippers, carriers and users of tin plate to develop adequate equipment and satisfactory bracing methods. Today, tin plate is shipped in palletized fibre board packages, wrapped on the inside with moisture resistant paper. The packages are combined into a floating unit load. By use of a rubber bumper on each end of car, plus mechanical brakemen plates, burst packages and damage to ends of the tin plates has been greatly reduced, and the cost of bracing and blocking cut 60 per cent from the previous standard method.

The performance of the cars is said to be highly satisfactory, based on random observation of load behavior in many areas and destination inspection reports.

New York Central's 375 Alco diesels are equipped with Ni-Resist exhaust manifolds. (Upper right) Part of manifold used on NYC locomotives to eliminate costly, time-consuming "between-overhaul" maintenance on diesels.

Ni-Resist exhaust manifolds save work! Long life cuts "between-overhaul" maintenance

The New York Central System obtains 24 to 30 months' life and more from diesel engine exhaust manifolds of Ni-Resist* austenitic iron, alloyed with nickel and chromium.

This service matches the railroad's regular overhaul period.

New York Central thus eliminates between-overhaul maintenance of exhaust manifolds on some 375 Alco passenger, freight and road switch locomotives.

The road makes a big cut in maintenance labor and expense. But that isn't the whole story . . .

Ni-Resist manifolds minimize burnouts

Burnouts that disrupt schedules and cause expensive delays are reduced, because Ni-Resist manifolds retain ample strength at temperatures in the range of 1200°F. They give satisfactory service on turbocharged and supercharged diesel engines because...

Ni-Resist manifolds are heat resistant

They resist oxidation and scaling. The scale that does form is thin, tight and adherent. No "flake-off" to damage turbine blades. Use of Ni-Resist austenitic cast iron prevents warping and growth as well as cracking. The expansion rate of Type 3 Ni-Resist iron conforms with that of other parts in the engine system. So joints stay tight.

In certain other types of engines Type 2B Ni-Resist parts may be used for a different level of expansivity. Ni-Resist castings can save you money in other diesel engine applications, too. In cylinder liners, valve guides, and ring groove inserts for aluminum pistons. If you are having trouble with such parts, fill in the coupon . . . mail it now.

*Registered Trademark

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.
Gentlemen: We're having trouble with

☐ exhaust manifolds ☐ cylinder liners
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due to heat ☐ corrosion ☐ wear ☐

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☐ Please send booklet, "Diesel Dan's Manual".

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

Ideas for the Diesel Repair Man...

Inspecting F-M Cylinder Water Jackets

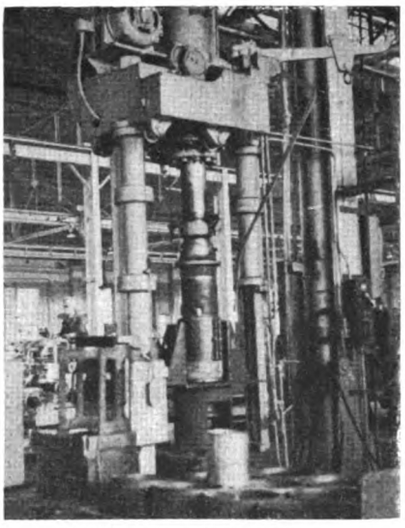
Fairbanks-Morse cylinder liners and water jackets are disassembled and completely inspected by both the Pennsylvania and Milwaukee.

Driving-box crown brass press on Milwaukee has been adapted with two fixtures for job. One permits the liner to be pressed out of the jacket; the other presses the jacket on the liner a little beyond its normal position to permit the installation of the locking ring.

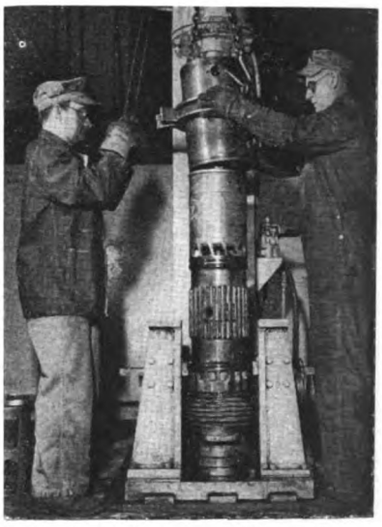
After liner and jacket are separated, they are wire brushed and examined with Magnaglo. A shop-built induction heater with automatic 6-min timer heats the jacket to 275-deg and it is installed over new seals. Inspection date is then stencilled on it. Complete assembly operation takes 8 min.

Pennsy uses its induction heater for the same purposes. Jackets are heated for removal. Liners and the jackets are then cleaned and checked. Jacket is then expanded and forced into position with the specially-built air press. After cool-

(*Continued on page 70*)

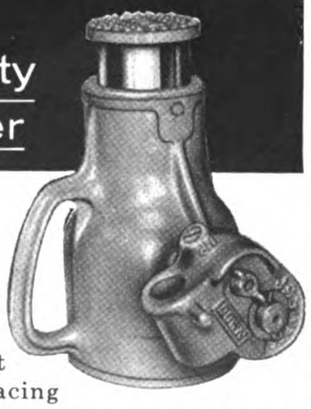


Press at Milwaukee, Wis., shop.



Pennsy built its own at Altoona, Pa.

WESTERN
LOCOMOTIVE and CAR
JACK
lifts capacity
loads easier



WESTERN has made the first major change in Locomotive and Car Journal Jacks by adding Timken tapered thrust roller bearings, replacing ball bearings. This major improvement means reduced friction, greater speed, easier operation and less maintenance . . . available in 25, 35 and 50 ton capacities. Aluminum or malleable steel housings available in 25 and 35 ton models.

8018

Write for Bulletin No. 1957

WRRS
WESTERN RAILROAD SUPPLY COMPANY
Division of Western Industries, Inc.
2400-2434 S. Ashland Ave., Chicago 8, Ill.

How Metallizing saves money in railroad shops

"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications
Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scatches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

Some of the 28 major railroads using Metallizing:

A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

METCO
Metallizing Engineering Co., Inc.
1117 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain: Telephone: EDGEWOOD 4-1300
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

Check list for a customer: to measure the quality in a supplier's products

You measure the quality of a supplier's product two ways... by the way his product is made—and by the way it serves you on the job.

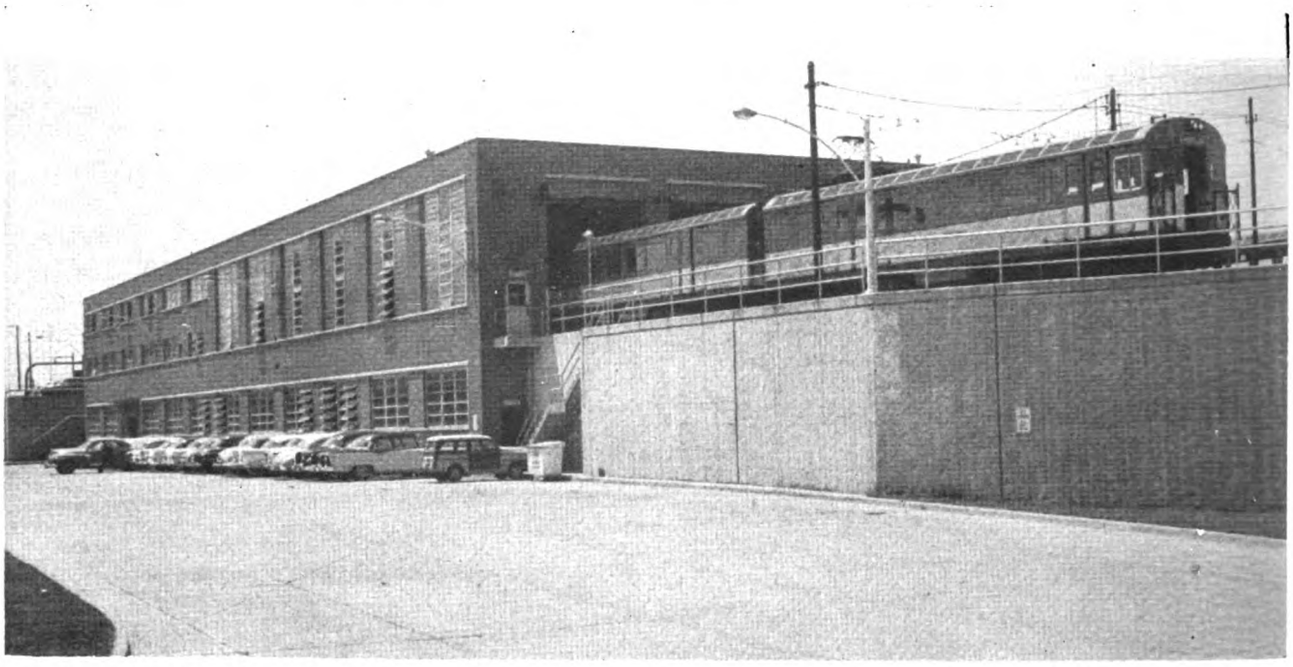
Count the years of service you have already received—the additional years you know your cars will deliver. Walk down your rip-tracks, check your bad order cars. Then note the design and performance of the car components that have served your operation best.

Performance that cuts your costs by lengthening the life of your cars, by providing dependability and efficiency, is performance that's designed and built in by a responsible supplier.

This is the way to judge a supplier's product. Next month we'll show how a responsible supplier continually strives to improve his product design, thereby constantly offering improved performance and new product-uses to you.

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY

General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco



Inspection and running maintenance are performed on the upper level, truck work below.

'Rapid' Shop Has Everything

Cleveland Rapid Transit shop is highly mechanized to meet all needs of inspection and running maintenance

DESIGNED from the ground up, to include a maximum of automation, the "Rapid" shop in Cleveland, Ohio, includes many items of interest to all operators and maintainers of electrical car equipment.

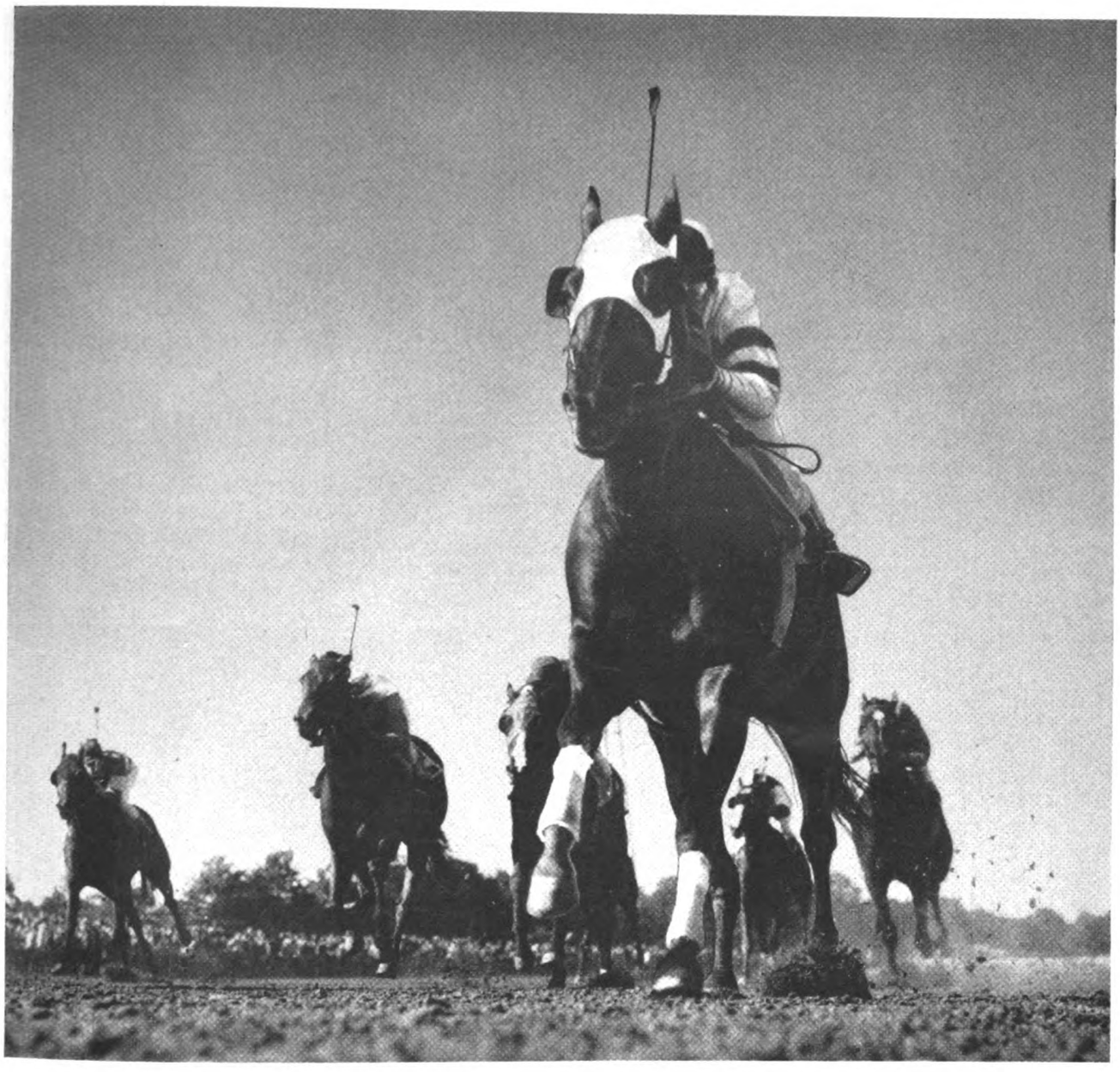
The shop includes an upper level in which there are three shop tracks, a lower or street level for truck work, and a balcony in the upper level where pantographs are removed, overhauled and replaced.

The equipment which is maintained in the shop at present includes 88 cars, 70 of which are permanently coupled to make 35, two-car trains. The other 18 cars may be operated as single units. Each car

Inner section of the No. 1 pit where running inspection is performed.

Outer section of the No. 1 pit showing controller inspection.

Traction motor location shows exhaust head and duct. Arrow, bottom, is used for spotting.



For Full Power when it's needed most, specify **gould** batteries...

America's Finest!
GOULD KATHANODE
BATTERIES
for Air Conditioning
and Car Lighting

Here's why: You know that an overload can cause an unusual drain on your batteries. At such times your batteries must be in "good health" or they may not survive the strain. Keeping batteries in "good health" is not difficult, all it takes are good routine checking procedures which give you a day-by-day record of a battery's condition. By consulting these records frequently you can always be sure of full power when it's needed.

An important part of the Gould service is to help you establish such a sound preventive maintenance program, and teach your battery maintenance personnel the importance of following recommended procedures. This is another reason why it pays you to specify Gould. Want more reasons? Write for booklet " . . . so you're going to buy an industrial battery." Gould-National Batteries, Inc., Trenton 7, N. J.

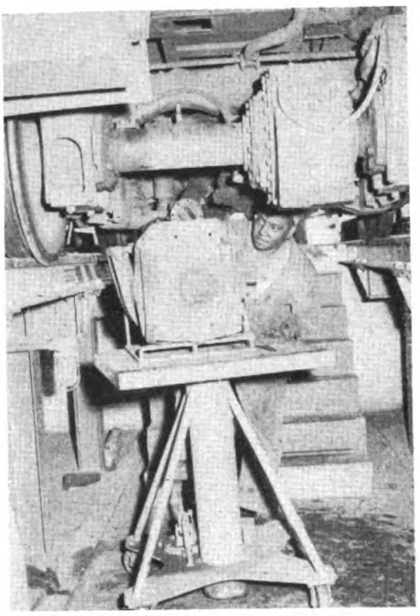
Always Use Gould-National Automobile and Truck Batteries

More Power to you from Gould

© 1957 Gould-National Batteries, Inc.

'RAPID' SHOP . . .

A motor is lowered into the No. 2 pit on to a portable hydraulic lifting table.



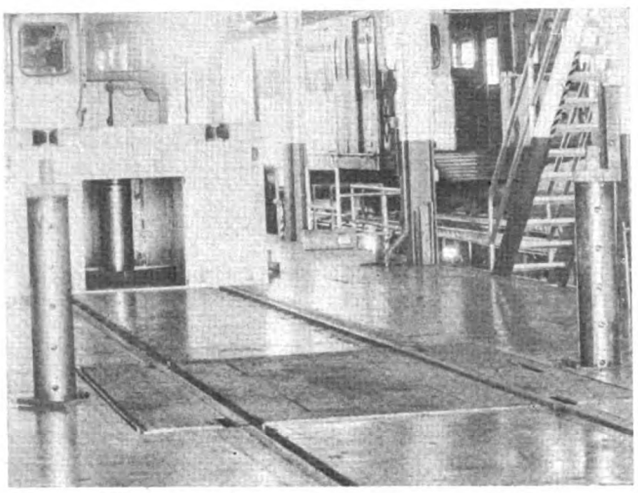
The portable table is rolled under a car preparatory to lifting the motor into place.

is equipped with four, 55-hp, 300-volt motors, permanently connected, two in series. There is no transition and the cars are operated in multiple-unit up to eight car trains.

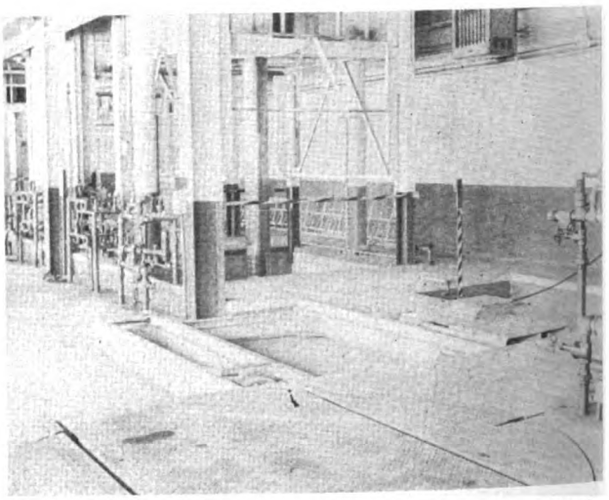
The shop is 242 ft long by 85 ft wide, and there are two full-length through tracks on the upper level. The first track has an inspection pit which extends the full length of the shop.

There is a half-length inspection track on the second track. On the other half of the second track, there are four hydraulic hoists spaced to match the truck positions of a two-car train. These hoists can lift the two-car train complete.

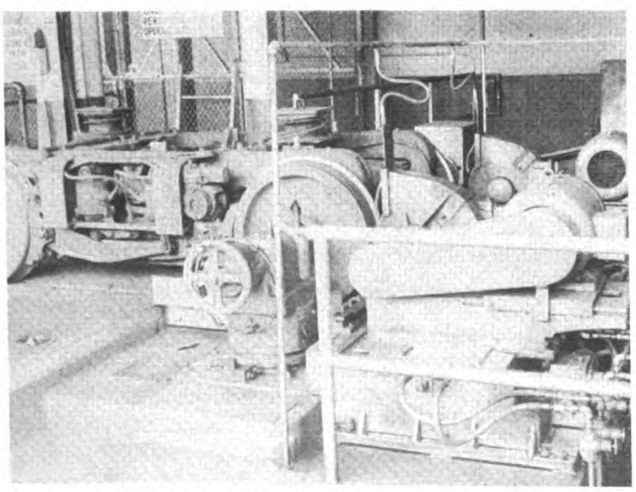
Then if the trucks are to be removed, four hydraulic jacks may be raised to jacking pads on the sides of each car. With the car supported on these eight jacks, dowels are



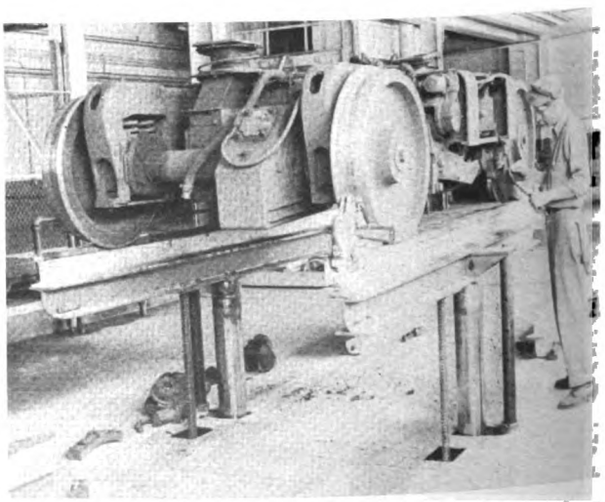
At rear, left, is one of the four hydraulic hoists on track No. 2 used to lift a single or 2-car unit. At the front are two of the 8 hydraulic jacks used to support the car bodies when the trucks are removed.



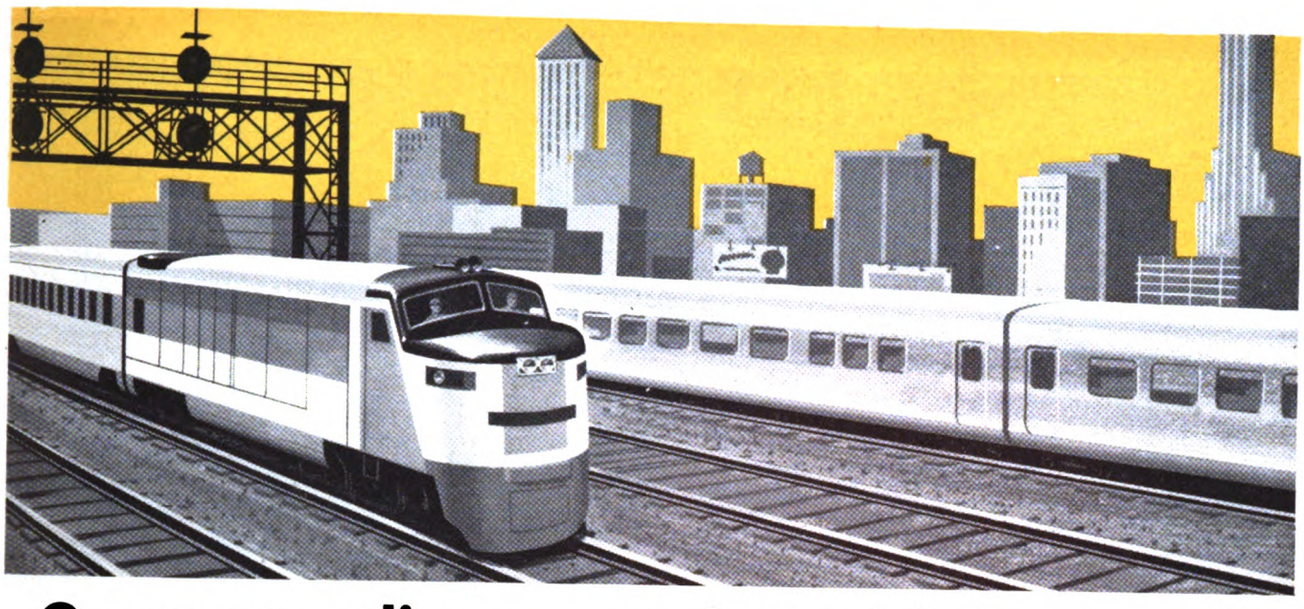
The truck hoists lower trucks to the lower floor where a transfer table and turntable are used to move them to the wheel lathe or truck repair stand.



Wheel grinder on which wheels are ground in the trucks.



Hydraulic jacks lift the trucks to a convenient working height on lower floor.



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SHELL TALONA R OIL 40

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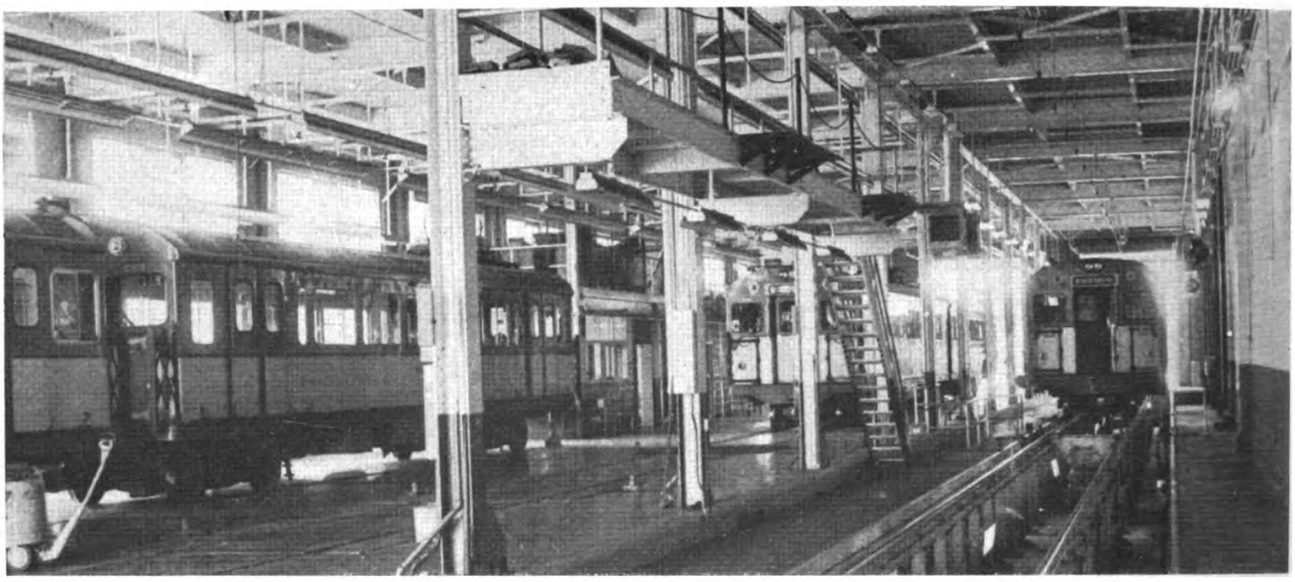


A monorail and chain hoist are used on the pantograph balcony for removing and applying pantographs.

pushed through holes in the jack pistons, so that pressure may be released from the jacks and the car supported on the dowels.

It is then possible to disconnect the trucks and lower them on the hydraulic hoists to the lower floor of the shop where the truck and wheel work is performed. A single truck may be removed by the same procedure.

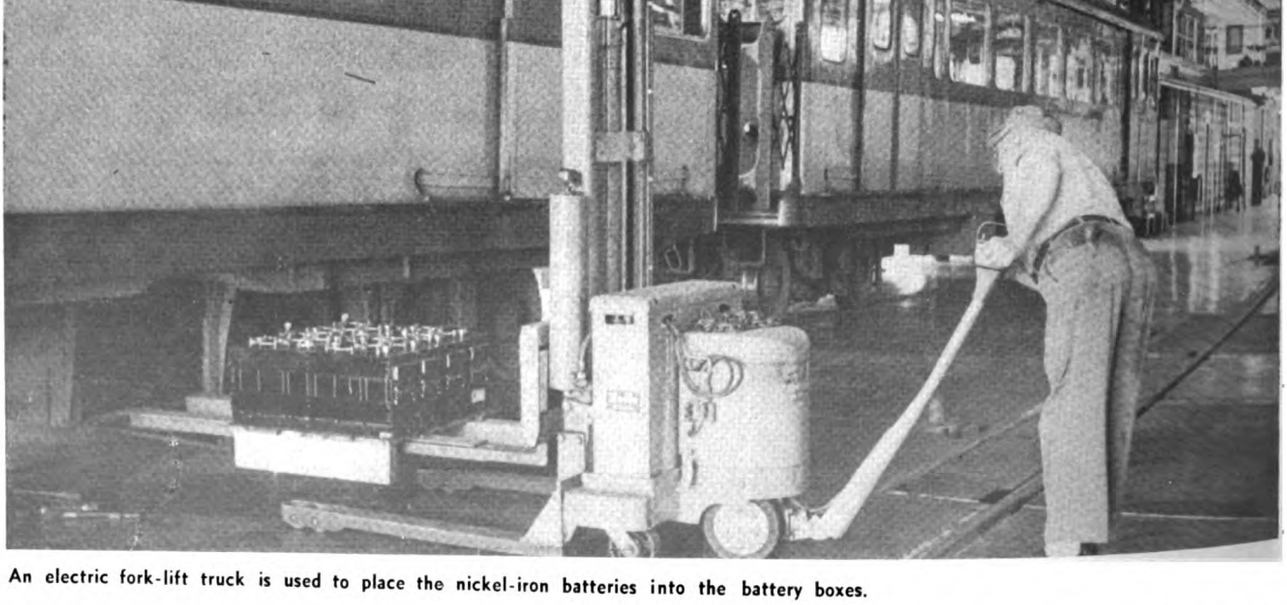
The third track is also half length and is a floor-level track. The remaining section of the shop in line with the third track is used for office, tool room, oil room, etc.

Running inspection, performed on the first position of the first track, consists of removing motor and control covers, blowing them out with compressed air. Immediately under each truck and control compartment is an exhaust intake through which air is drawn by an exhaust fan driven by a 10-hp motor. Dirt released by an air hose jet is drawn into the duct, and exhausted through a water curtain in a room on the lower floor. A movable collector, shown in one of the illustrations, is used to direct the dust to the intake duct. On the second position of the first track, inspection, making any necessary repairs, and lubrication work are done. All lubricants are piped to lubricating positions from the oil rooms. This position also has eight hydraulic jacks to lift the car bodies from the center plates for lubrication.

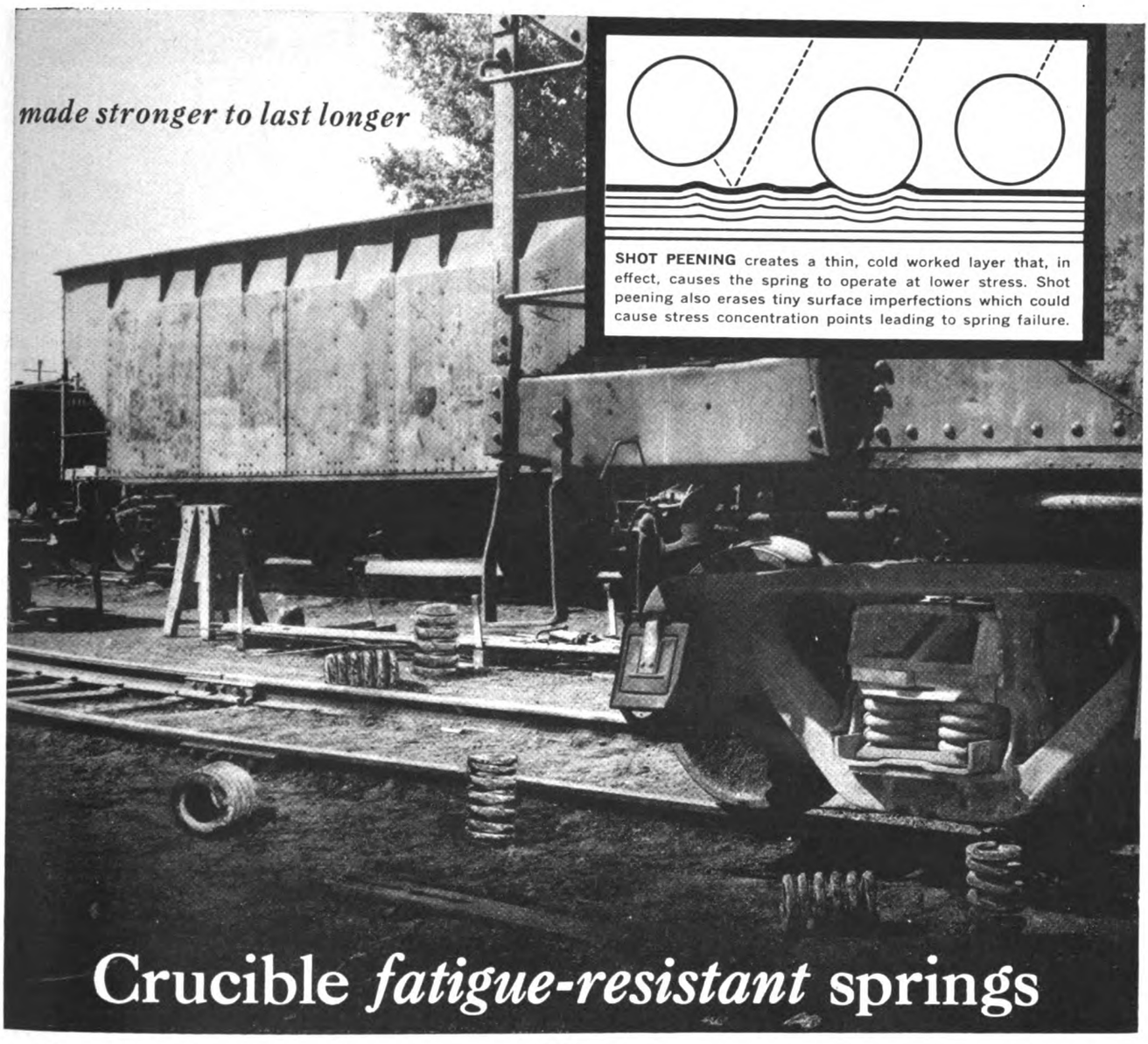
The half-length pit under the second track is used for miscellaneous work such as removing and replacing individual motors, compressors, couplers, etc.

Pantographs are inspected and lubricated from an inspection platform, located between the No. 1 and No. 2 tracks. Lights on the platform indicate a dead trolley. No lights indicate a live trolley and each inspector has his own padlock to lock the 600-volt trolley switch open. Pantographs have carbon contact surfaces.

All lighting in the shop is fluorescent.



An electric fork-lift truck is used to place the nickel-iron batteries into the battery boxes.



help keep cars off the repair tracks

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Crucible *fatigue-resistant* springs are stronger because they're single heat treated and shot peened. These processes provide better hardenability, higher elastic limits and greater resistance to working stresses.

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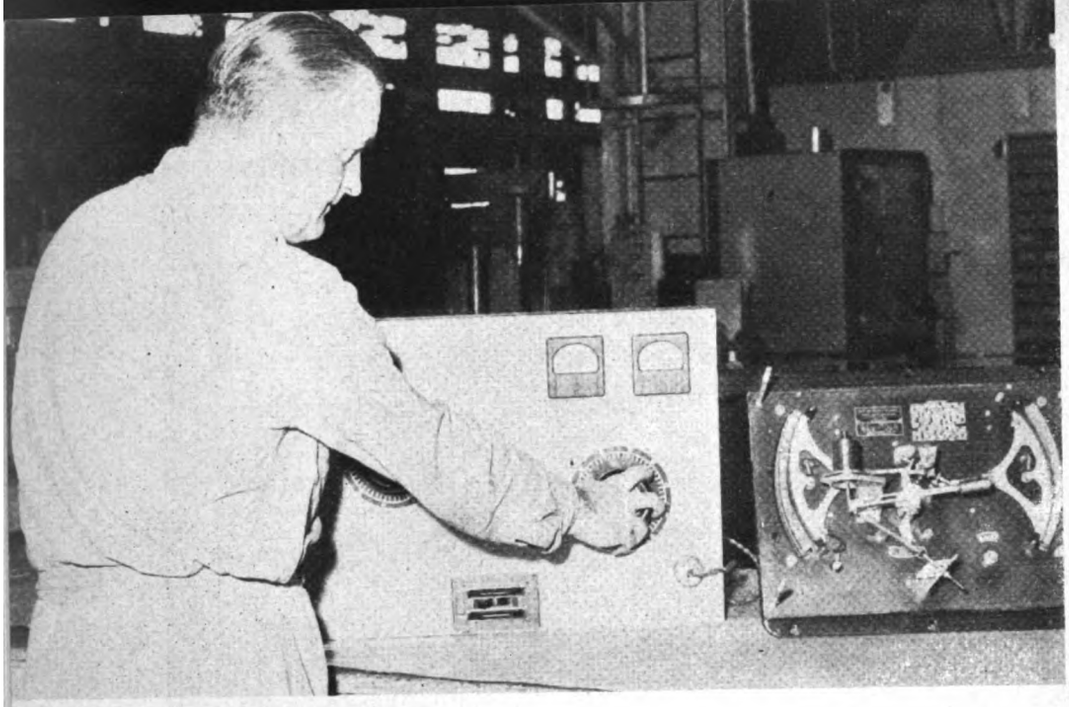
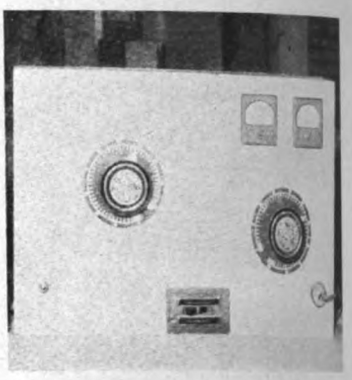
CRUCIBLE spring division

Crucible Steel Company of America





Voltage regulator (above) tester has dial at the left controlling the 50-ohm rheostat. The one at the right, the 8-ohm rheostat.

Operator (left), is using the 10-volt meter to run the regulator through its full range of action.

Tester Assures Voltage Regulator Performance

When auxiliary generator voltage regulators are returned to service after cleaning and overhaul at the Baltimore and Ohio Glenwood shops in Pittsburgh, Pa., their satisfactory performance is assured by a small portable test cabinet. It contains a 50-ohm rheostat; an 8-ohm rheostat; a 100-volt, full-scale, voltmeter; a 10-volt voltmeter; a double-throw, double-pole switch; input and output terminals and a single pole switch in the power supply circuit, all arranged as shown in the diagram.

Power from a small d-c generator is supplied to the input terminals at 75 volts.

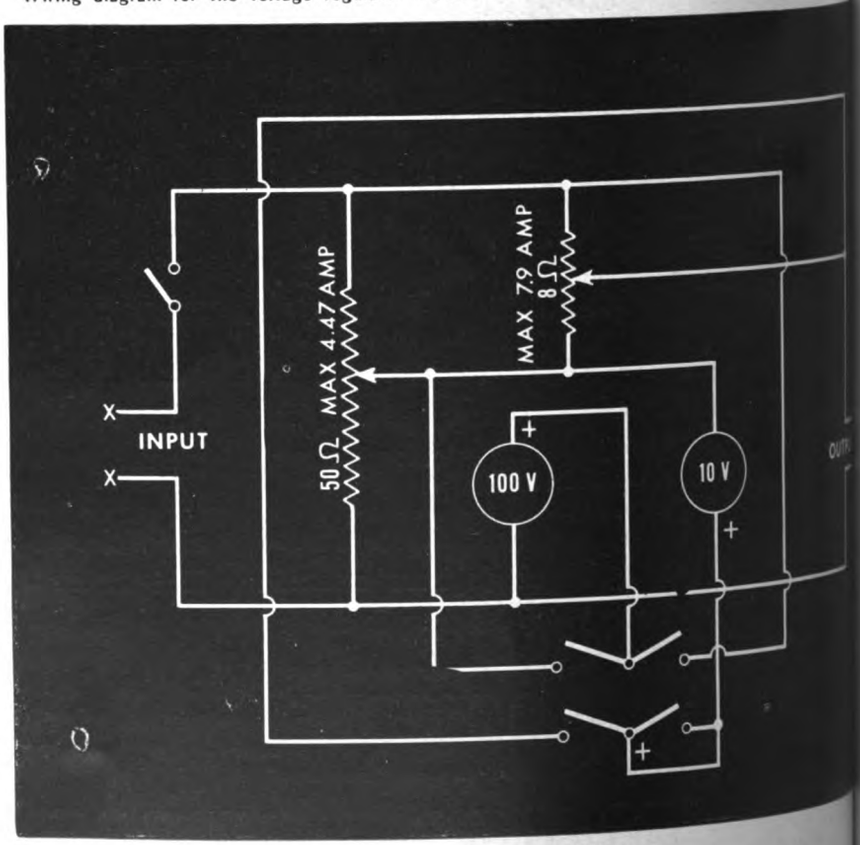
The voltage regulator under test is connected to the output terminals.

To test a regulator for proper performance, the 50-ohm rheostat is first adjusted to produce a reading of 75 volts on the voltmeter with a 100-volt scale. Then the two rheostats are adjusted so that one voltmeter reads 65 volts while the other reads 10 volts. The test is then made by running the voltage on the regulator from 65 to 75, the 10-volt meter acting as a vernier for accurate measurement of this variation of voltage.

If the regular is functioning properly, the torque motor should move from one extreme position to the other while the voltage is varied over this 10-volt range. The action of the regulator is observed, and if it does not move smoothly from one end to the other, it is rechecked for trouble with the torque motor, for trouble with the mechanical linkage, for binding, for improper spring tension or for dirt in moving parts. Since this method of testing has been in service, it has practically eliminated faulty operation of voltage regulators after they are replaced on the locomotives.

The device was developed and constructed by John L. Kliment, electrician, Glenwood Shops, Baltimore and Ohio.

Wiring diagram for the voltage regulator tester.



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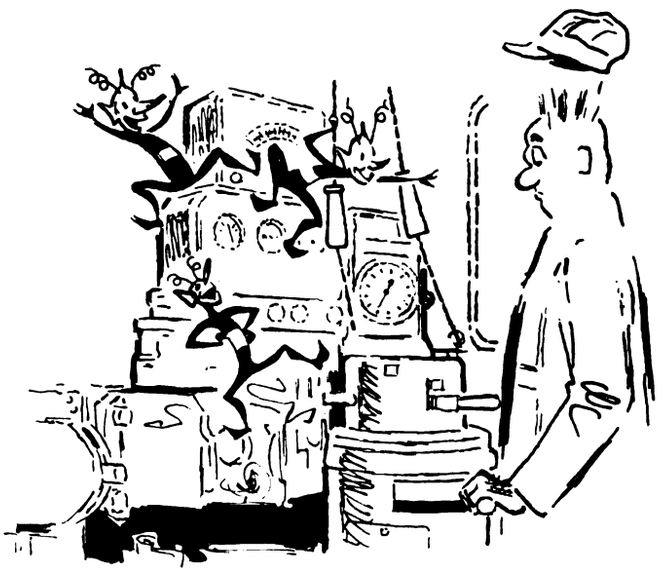
The Diesel That Moved With the Throttle in Idle Position



By Gordon Taylor

NO WELL BEHAVED locomotive should start moving when the throttle is in the *Idle* position, with engine idling and both the shunt and battery fields de-energized on the main generator. But that is what happened on a certain railroad when the hostler moved the reverser handle on a GP-7 unit to forward position, with the throttle in *Idle*. To stop movement he quickly moved the reverser handle to neutral, set the brake, and called one of the maintainers.

The maintainer quickly discovered that both starting contactors had stuck closed. He moved the reverser forward and had the same experience as the hostler. He also noted that the series power contactors had picked up, but shunt and battery field contactors were not energized.

The reverser handle was quickly returned to neutral position. The maintained pried the starting contactors open with a stick of wood, shut the engine down and cleaned up the starter contacts. He then restarted the engine and the starting contactors dropped open in the proper manner. The locomotive then resumed normal operating behavior. That is, it would not start moving until the throttle was placed in *run* position.

The maintainer had done a good job, but he was puzzled. He wondered if the uncalled for movement of locomotive was caused by current supplied from the battery and the auxiliary generator, or if in some manner, the main generator had become excited to a point where it was generating a current to move the locomotive.

Since the generator had been operating at idling speed with the shunt and battery fields de-energized, the maintainer wanted to clear up the question. He referred the question to "Doc" Watts, the electrical foreman at the system diesel house. Watts, glad to assist some one wanting to learn wrote the maintainer as follows.

"The trouble you reported could only happen on units wired in a certain way. For example, it would not happen on a GP-9 unit which has a little different wiring plan than is used on your GP-7 unit. Before we go into the explanation of what source of current caused the locomotive to move, let us consider the purpose and use of the a-b interlocks on the starting contactors. When the starting contactors are closed, their interlocks will be in an open position. These interlocks can be wired in the control circuit in different ways which we will list as Case 1 and Case 2.

Case 1. This is your GP-7 unit. The *a-b* interlocks of the starting contactor are wired into the control circuit so they interrupt the flow of current from the battery to the operating coil of the shunt field contactor, when the starting contactors are closed or sticking closed. When the shunt field contactor is not energized, its a-b interlocks will not close to energize the *BF* (battery field) contactor. Consequently, both the shunt and battery fields will be de-energized when starting contactors are stuck closed.

Case 2. Wiring on GP-9 units. The *a-b* interlocks of the starting contactors are wired into the control circuits in a tap from the reverser wires *FO* and *RE*, between the *g-h* controls of the isolation switch and the control circuits that operate the series and parallel power contactors. In this position, the open a-b interlocks of the starting contactors will prevent the closing of the series contactors. This also serves to keep the shunt and battery fields de-energized, since the shunt field contactor is held open by interlocks on the *S13* and *S24* contactors. With the shunt field contactor de-energized, the *BF* battery field contactor cannot close since, it depends on the a-b interlocks of the shunt field contactor being closed. Consequently this

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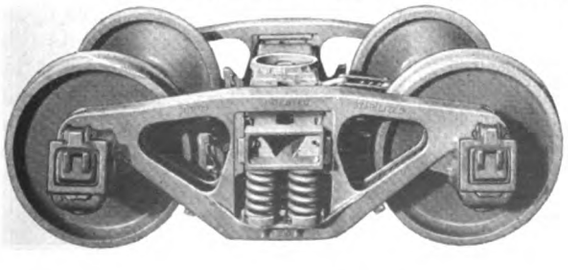

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STABILIZED TRUCKS

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plan of wiring prevents the series power contactors from picking up and keeps the shunt and battery fields de-energized in case the starting contactors are stuck closed. It is apparent that the wiring on the GP-7 unit in question followed the plan outlined in Case 1, since the series contactors actually picked up with the reverser switch closed, and with the shunt and battery fields not energized.

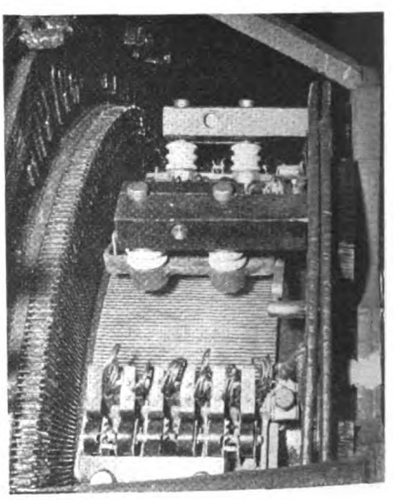
We are now ready to consider what caused the locomotive to move with the engine idling, with the shunt and battery fields de-energized, with the starting contactors **stuck closed,** with series contactors picked up or closed by movement of the reverser to either forward or reverse positions. This situation left the battery and auxiliary generator across the mail generator leads. The series power contactors being closed served to connect the traction motors to the main generator. Since the storage battery was also connected directly across the main generator leads, it supplied current to the traction motors to move the unit during the moment when the reverser switch caused the series contactors to close.

A well-charged battery, supplying 70 to 75 volts direct current to traction motors will cause them to move the unit on a level track. To give an idea of what a comparatively low voltage source of power can do with traction motors, direct current welding machines set at 60 volts are regularly used to motor out traction motors, removed from truck on the repair shop floor. Leads from a direct current welding machine are often connected to a traction motor in an assembled truck, to move the truck on the shop floor, into position beneath a jacked up car body. From this practice, it is understandable that current from the 74-volt battery will cause the locomotive unit to move when the series power contactors are closed.

The *a-b* interlocks of starting contactors, when wired as in Case 2, will avoid the trouble you experienced. It also avoids any possibility of the main generator sending high voltage power into the low voltage control system when the starting contactors are stuck closed. This should help clear up the problem.

How Much Do You Know About Brushes?

How Do Solvents Affect Commutation?



THE DISASTROUS EFFECT which promiscuous use or misuse of solvents in the cleaning of equipment can have is a real problem. To improve the commutating characteristics of brush grades, nearly all brush manufacturers today include some form of treatment either for the purpose of reducing friction or for film forming properties or both. In all cases, the film is susceptible to the action of solvents, and in many cases the impregnant of the brush is also subject to action by solvents. Solvents of the chlorinated hydrocarbon type, in other words those containing chlorine, are ruinous to film and friction values of brushes. In one case, we observed a generator where solvent had been used freely all over the brushes and the commutator. This unit came off the road dead with the generator brush shunts burned off, spring fingers burned off, and brushes practically burned out of the holders. Some holders were even melted. The basic cause of the trouble was traced to selective action of the brushes, induced by the use of solvent.

What I believe happens in these cases is that one of the brushes in a given holder will carry most of the load due to the fact it doesn't get quite as much solvent treatment as the others, and during this extreme overload, the connections are overheated and become high resistance. As the generator continues to function, the next brush least affected by the solvent comes into action and normally operates in parallel with the first brush. However, the connections on the first brush are now high resistance and the second brush proceeds to carry all of the load. The vicious cycle continues until all four or five brushes in the holder have been subjected to the same heat treatment. Now, since all of the connections are high in resistance, the lowest resistance path for the current to flow into the brushes is through the spring finger and *A* clip. When the current starts to divert, and more and more of it goes through the spring finger and *A* clip, the spring fingers become heated. As they heat the resistance changes until eventually the tips of the spring fingers are burned off and then general destruction takes place. Laboratory tests have shown that when a commutator has been washed with solvents, the friction of the brushes is increased temporarily as much as 200 or 300 per cent until such time as the brushes can lay down a new film. It is true that the film appears to be untouched when you inspect it after the solvent has evaporated but nevertheless it does strip off and has to be rebuilt by the brushes before the friction level goes down.

There are times when it is impossible to clean up a machine without the use of solvent. But there is no time when it is necessary to do this job without first removing the brushes from the holders and out of the machine to prevent their coming in contact with the solvent material.

By K. R. MATZ
National Carbon Company

This is the seventh of a series of questions and answers which are appearing each month.

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BROWNHOIST

SUPPLY TRADE NOTES

(*Continued from page 18*)

000 plastics research laboratory at its East Chicago (Ind.) plant. The laboratory, equipped to test all existing plastics and to develop new types and new uses, is divided into three sections —a physical testing room, a unit to conduct research in reinforced plastics, and a section equipped for research on both vacuum-forming and injection molding of thermoplastics.

J. T. Degman

J. E. McNamara

R. O. Wilder

G. Dusenbury

OAKITE PRODUCTS, INC.—*John T. Degman* has been assigned to Chicago as special railway representative. Mr. Degman was formerly assistant to the vice-president of the Rail Joint Company.

■

JOURNAL BOX SERVICING CORPORATION.—*James E. McNamara,* vice-president, has been elected president, succeeding *Leo C. McNamara,* who is now chairman of the board and chief executive officer.

■

NATIONAL FORGE & ORDNANCE CO.—*Robert O. Wilder,* executive vice-president, has assumed the duties of president, succeeding *John C. Harrington,* who has been named chairman of the board of directors.

■

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—*George Dusenbury* has joined Simmons-Boardman at New York, as vice-president and editorial and promotion director, according to an announcement by Arthur J. McGinnis, executive vice-president and treasurer.

Mr. Dusenbury has been a magazine consultant for the past 10 years, specializing in the business field, but serving several general magazines here and abroad. He has held annual editorial clinics for the Associated Business Publications and seminars at Columbia University and the University of Tennessee. Prior to that Mr. Dusenbury taught "Technique of the Picture Story" at New York University. He also was director of Visual Research for Look Magazine. Before going with Look, Mr. Dusenbury was on the staff of Compton Advertising, Inc., of New York.

Mr. Dusenbury's interest in journalism and the printed message has been life-long. At Highland Park High School, Detroit, class of 1927, he was editor of "The Spectator," the school newspaper, and president of the Michigan Interscholastic Press Association.

He was gradutated from the University of Michigan in 1931 where he edited "Michiganensian," the university yearbook, and the Michigan campus magazine.

One of his first jobs encompassing both editing and advertising was with the Plymouth Division of Chrysler Corporation in Detroit where he served as advertising production manager, copywriter and editor of the dealer house

(*Continued on page 54*)

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How is this performance possible? THE MILLER GOLD STAR SR introduces a . . .

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NEW completely sealed semi-metallic rectifier

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Tested across the country by practical, critical, hard-bitten working weldors, here's what they say about the new Miller GOLD STAR SR:

"it's the DC performance I've always wanted"
"here's DC welding current that's . . . perfect!"
"positively handles ALL electrodes better"
"best deal I've seen for v and o work"
"easiet arc starting in my experience"
"smoothest arc I ever used . . . and . . . quiet!"
* "it's just plain the MOST"

Complete particulars on the MILLER GOLD STAR SR, including inert gas and automatic fixture welding, is now available on request.

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Every pound below design pressure drops air tool performance nearly 2%

Keep production going...use Ingersoll-Rand air tools and keep pressure up with Ingersoll-Rand compressors.

Perhaps an Ingersoll-Rand ES Compressor will build your Air Power System to full capacity

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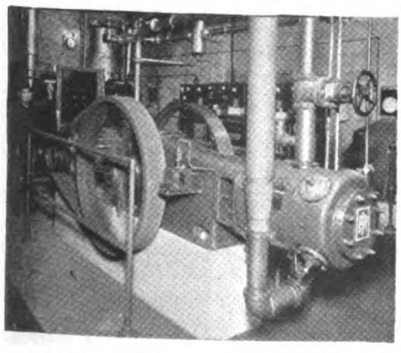
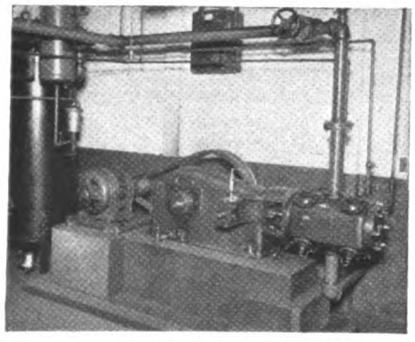
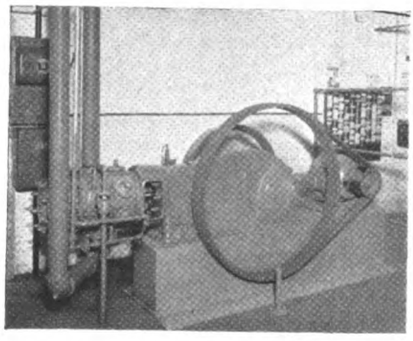
If your increased usage of compressed air has outstripped compressor capacity, an additional heavy-duty ES compressor will be a highly profitable investment. Your Ingersoll-Rand representative will be glad to help you make an air survey and recommend the most economical solution to the problem.



This Class ES compressor provides 100 psi air for operating air tools in the foundry and machine shop of a large manufacturing company.



For more than 15 years, this ES compressor has been providing a dependable supply of air at 100 psi for general plant service in an Eastern metal products factory.



Air tools used in a large woodworking plant are operated at top efficiency by the heavy-duty ES compressor shown above, delivering air at 100 psi.

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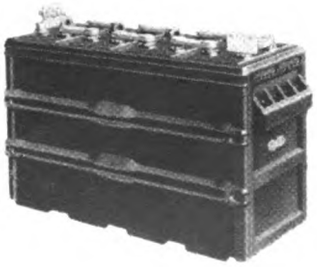
Tells how to reduce locomotive maintenance ... how to 'start your Diesels fast'

Motive power men and purchasing agents will find page after page of useful money-saving information in this comprehensive new bulletin on "Diesel Locomotive Batteries." Expressly prepared to help railroad men specify the right type batteries for dependable Diesel cranking service, this illustrated guide gives the complete "inside story" on the construction and operation of powerful C & D *Slyver-Clad*® batteries. Conventional lead-antimony types . . . special low types . . . as well as the latest lead-calcium extra-long-life types are covered. Detailed charts show you how to specify the exact type battery you need for reliable low-maintenance operation.

Write for a copy. You'll find it an important addition to your technical library.



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of Conshohocken, Pa.
SINCE 1906
SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

SUPPLY TRADE NOTES

(*Continued from page 52*)

organ. He later left to go with Ross Roy, Inc., Detroit, as a writer and account manager. Other experience includes a stay with J. Stirling Getchell, Inc., of New York, as a copywriter and the Allis-Chalmers Manufacturing Company of Milwaukee as assistant advertising manager.

A member of Sigma Delta Chi, professional journalistic fraternity, and several honor societies including Phi Eta Sigma, Sphinx and Michigamua, Mr. Dusenbury is also the author of "The Language of Pictures," and with his wife, Jane, co-authored another book, "How to Retire To Florida," published by Harper & Bros.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Dr. W. Kenneth Bock,* manager of metallurgical research, has been appointed director of research.

■

MAGNUS METAL CORPORATION.—*C. Robert Weaver,* Los Angeles plant manager, has been appointed western sales representative at Los Angeles.

■

C & D BATTERIES, INC.—A new division to undertake basic research on storage batteries has been established by C & D, in charge of *Dr. Eugene Willihnganz,* director of research.

■

STRATOFLEX, INC.—A new branch plant has been opened at Fort Wayne, Ind., under the direction of *J. C. Nolan,* plant manager.

■

INTERNATIONAL EQUIPMENT COMPANY, LTD.—*C. W. Smith,* assistant vice-president, has been appointed vice-president, Railway Division.

■

OHIO PISTON & MACHINING CO.—The *Ohio Piston Company,* Cleveland 14, manufacturer of a carrier for railroad pistons, has changed its name to the Ohio Piston & Machining Co.

■

AMERICAN AIR FILTER COMPANY.—*Robert E. Reid* has been appointed a special sales engineer, working out of the Boston office. *W. N. Murray* succeeds Mr. Reid as branch manager at Boston.

■

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.—*George M. Muschamp,* vice-president in charge of engineering, has been elected a Fellow of the American Society of Mechanical Engineers.

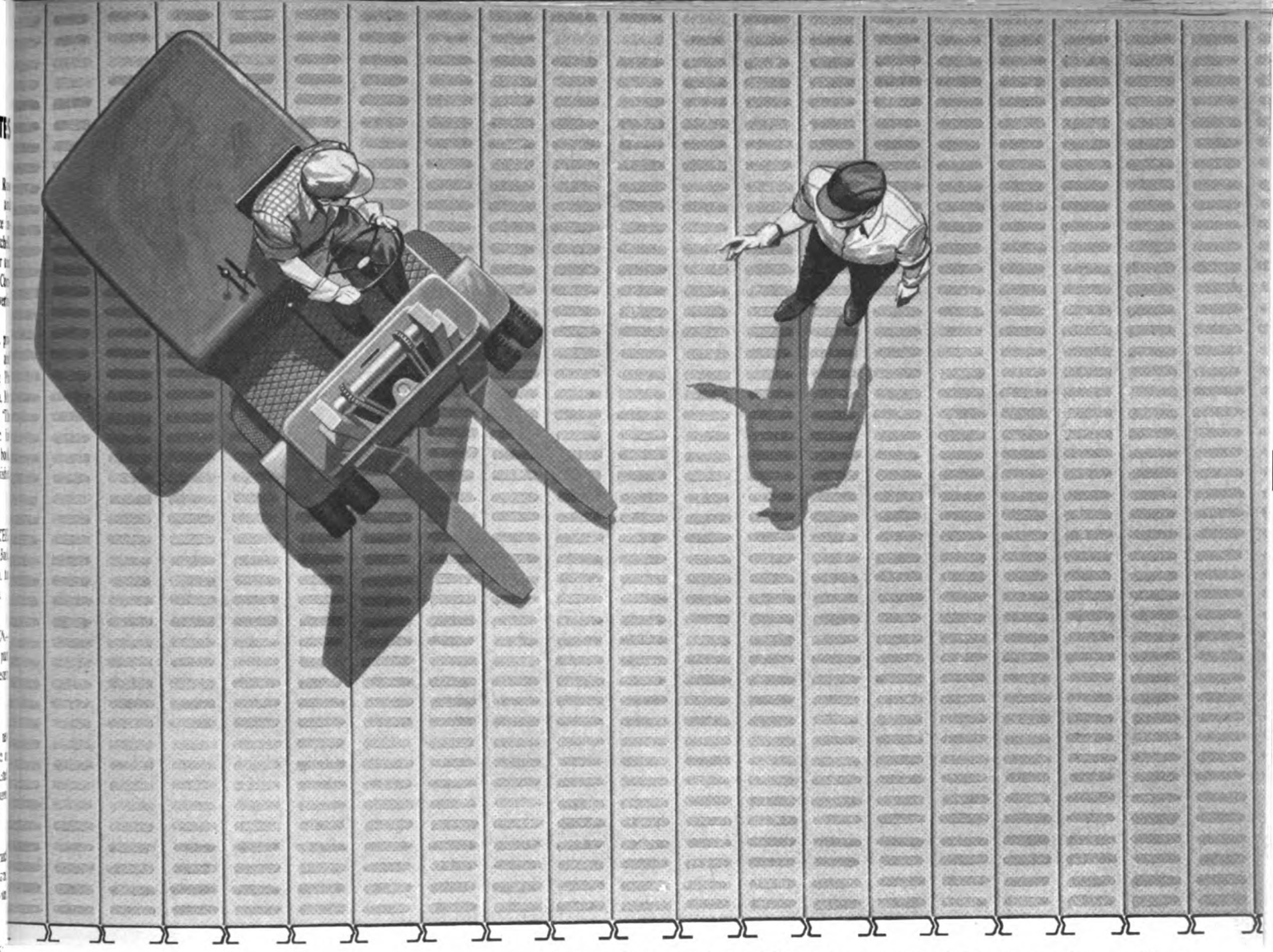
■

DEVILBISS COMPANY.—The DeVilbiss direct factory branch at Toledo, Ohio, has been moved to new and larger quarters at 1100 Northside Drive, N. W. *Roy Steele* continues as divisional sales manager.

■

ALCO PRODUCTS, INC.—*John M. Howard, Jr.,* manager of the company's Latrobe, Pa., plant, has been named general manager of the spring and

(*Continued on page 58*)

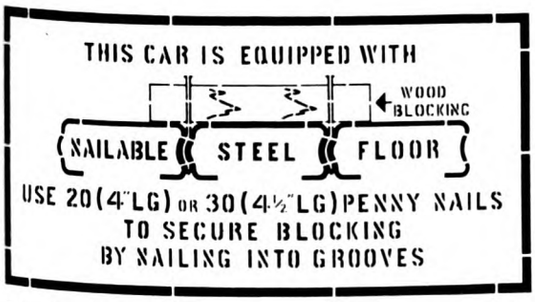


More ladings have traveled safely on N-S-F *equipped freight cars than on those equipped with any other nailable steel flooring.*

N-S-F® : PIONEER IN NAILABLE STEEL FLOORING

12 years of actual use in freight cars have proved the superior qualities of NAILABLE STEEL FLOORING. Sixty-two of America's leading railroads have installed NAILABLE STEEL FLOORING in over 60,000 gondolas and boxcars; the savings these roads have enjoyed is ample proof of NAILABLE STEEL FLOORING'S ability to deliver the goods.

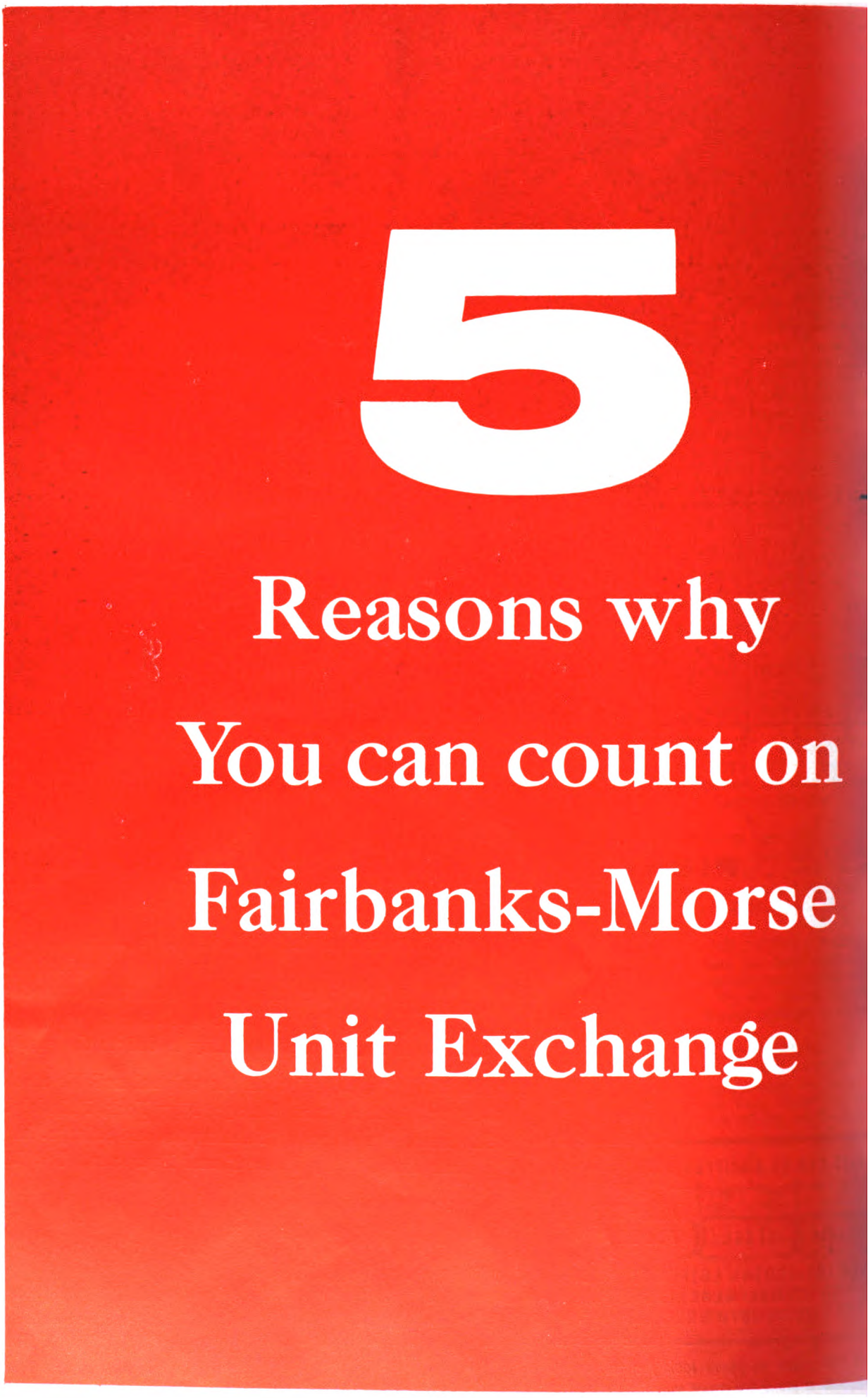
You can get information on the original nailable steel flooring from N-S-F representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal.



The stencil that smart shippers look for in freight cars. They know it identifies a car with better lading protection. And smart railroaders know N-S-F *can help reduce Cause F loss and damage claims.*

N-S-F is a registered trademark of Stran-Steel Corp.

NAILABLE STEEL FLOORING
Originated and sold by—
STRAN-STEEL CORPORATION
Dept. L • Detroit 29, Michigan • Division of
NATIONAL STEEL CORPORATION


5
Reasons why
You can count on
Fairbanks-Morse
Unit Exchange

1

PROMPT DELIVERY

Due to a 60% increase in the F-M unit exchange program, there are O-P engines of every rating and major accessory group ready for prompt shipment on your order.

2

LOW-COST UPGRADING

This F-M program enables you to effectively meet increased tonnage demands being made on your motive power fleet, yet reduces costs all along the line—lower maintenance, reduced shop facilities and lower parts inventory.

3

FACTORY-PERFECT

The only engine better than the O-P you now have is one "made better" by F-M craftsmen who have the skill and techniques acquired through daily experience with only *one* engine design.

4

NEWEST SPECIFICATIONS

F-M's continual search for better engine performance and life can substantially improve the O-P engine, and its components of five to ten years ago in many respects. Unit exchange equipment meets the newest specifications.

5

NEW WARRANTY

Each engine, blower, pump, injection system, generator and traction motor in the F-M unit exchange program is warranted to give the same performance as new equipment.

U→E

it Exchange

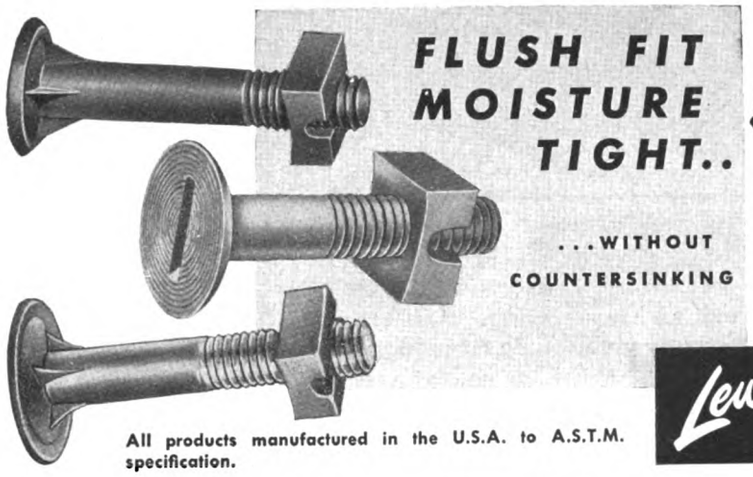
The only engine better than the O-P you have is an Opposed-Piston diesel made better by Fairbanks-Morse—available NOW through F-M unit exchange.

For full details and delivery schedules, write: Diesel Locomotive Service Dept., Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS.



FLUSH FIT MOISTURE TIGHT..

...WITHOUT COUNTERSINKING

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

SUPPLY TRADE NOTES

(*Continued from page 54*)

forge division, with headquarters at Latrobe. *Robert W. Pittman,* regional manager on the Pacific coast, has become Central regional manager, succeeding *Marshall D. Raymond,* now marketing manager at Latrobe. *E. J. Brown,* district manager in Chicago, succeeds Mr. Pittman as regional manager at San Francisco.

■

GENERAL ELECTRIC COMPANY.—*Thomas F. Perkinson,* manager of transportation, who assisted in developing and designing some of the earliest diesel-electric locomotives and in the design and application of air-conditioning equipment for railroad passenger cars, has been elected a Fellow of the American Society of Mechanical Engineers.

■

ACF INDUSTRIES, INC. — *William P. Hindman,* works manager of the Milton, Pa., manufacturing plant of ACF, has been appointed vice-president of ACF's newly formed Advanced Products division, at Milton.

■

CRUCIBLE STEEL COMPANY OF AMERICA—*John W. Slattery,* midwest supervisor, stainless steel sales, at Chicago, has been appointed general supervisor, stainless-steel field sales, Pittsburgh.

■

GENERAL STEEL CASTINGS COMPANY.—*Harry R. Bartel,* assistant vice-president—sales, has retired after 41 years' service. Coming from the New York Central, Mr. Bartel joined Commonwealth Steel Co., a predecessor of GSC, in 1916. He served in the engineering department before transferring to sales work. From 1931 to 1947 he was manager of Western District sales for GSC.

Mr. Bartel has established offices in St. Louis as a manufacturers' representative.

■

A. M. BYERS COMPANY—*Norbert J. Connors,* former president of Connors Steel Warehouse, Inc., has joined Byer's steel sales department, and *Morton M. Jenkins,* formerly with Pittsburgh Forgings Company, as steel sales metallurgist. *William R. Doreen* has become a field service engineer at Houston.

Obituary

A. LOU CAPRA, 54, traveling field representative for Miller Lubricator Company, died recently at his home in Denver, Colo.

■

EMMETT J. COLE, western sales representative of Magnus Metal Corporation, died in Los Angeles, August 9, following a brief illness.

■

DOUGLAS M. DEWITT, western manager, Reade Manufacturing Company, died August 11 in Chicago.

■

HAROLD H. JOHNSON, 56, director of research for Nation Malleable & Steel Castings Company, Cleveland, died in Cleveland Clinic Hospital, August 22.

EQUIPMENT

(*Continued from page 6*)

to batteries now used in larger locomotives of 1,200 hp and greater.

The batteries may also be applied to reduce number of batteries in inventory. For example, an MGD-19 which develops required cranking and standby capacities for large locomotives, is designed so that it may be used in both road locomotives and smaller switching locomotives, because of the smaller dimensions of the MGD-19. *Exide Industrial Division, Electric Storage Battery Company, Dept. RLC, Box 8109, Philadelphia 1, Pa.*

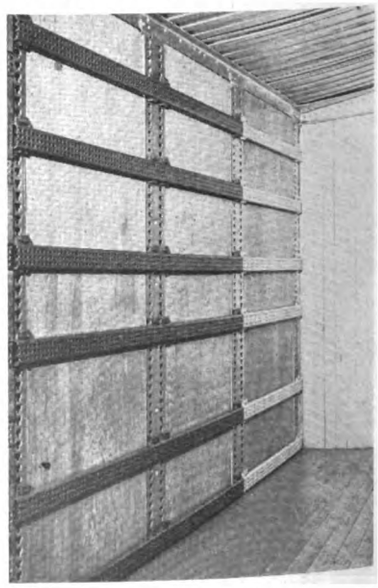
Permanent Dunnage For Freight Cars

The "Tri-Belt" loading system is a new type permanent dunnage for freight cars. Two types of "Tri-Belt" systems are available: (1) a permanent installation of horizontal steel side rails, welded in position between wood wall members and flush with the wall surface. (2) an adjustable installation with removable side rails which fit into T-slots on vertical channels. The channels are fixed in position during car construction.

The manufacturer offers the adjusta-

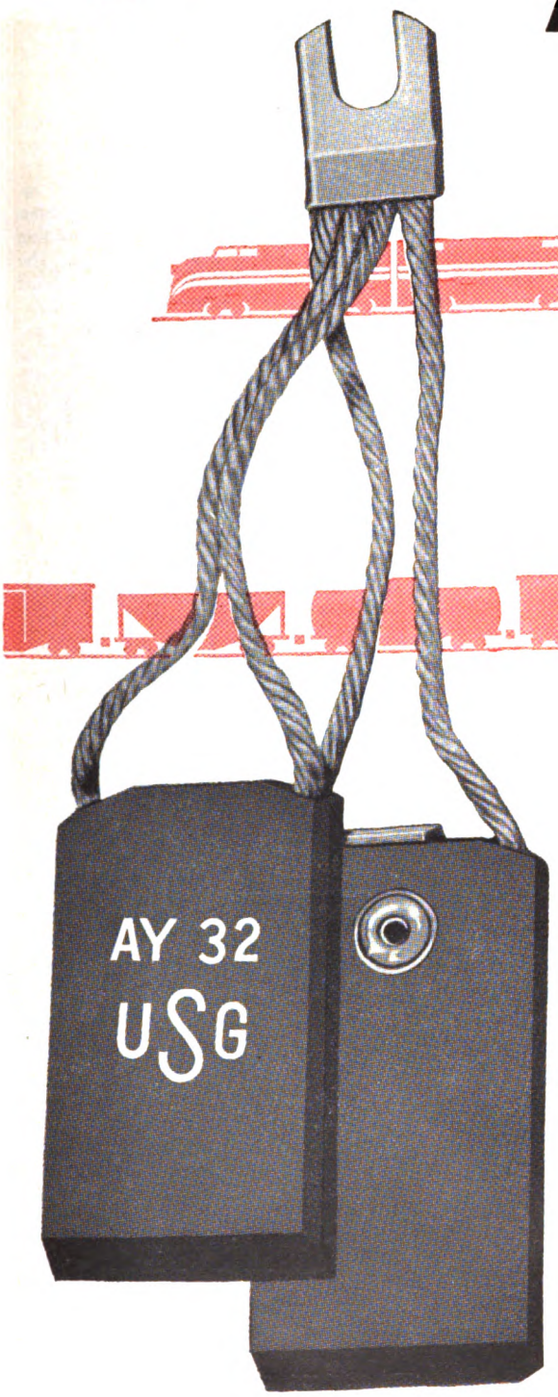
(*Continued on page 60*)

Permanent "Tri-Belt" installation



Adjustable "Tri-Belt' installation

USG® BRUSHES AY32 AND 2306 ARE THREE WAYS *BETTER*



LOW COMMUTATOR MAINTENANCE

Because of their long life and reduction of copper drag which minimizes flashovers, USG Brushes AY 32 and 2306 have proven convincingly that they reduce the maintenance cost on Diesel-Electric locomotive generators.

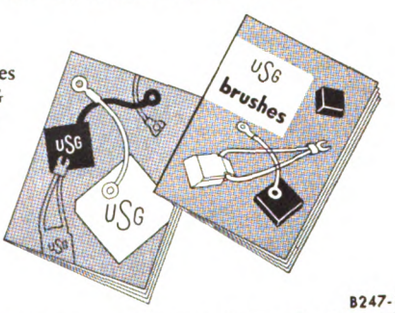
LONGER LIFE—MINIMUM WEAR

Primarily because of their purity and density, USG Brushes operate perfectly for substantially longer periods of time than the average type brush. Naturally, this means reduction in delays due to brush replacement.

PERMANENT SHUNT CONNECTION

In recent years nearly every reputable brush manufacturer has improved the anchorage of the shunt connections: none, however, are quite as firm or quite as permanent as the method employed on USG Brushes, called STATITE®. The shunt can't be jerked out and, of course, it does not jar loose.

Write for your copies of the latest USG Brush Catalog B-56 and the new USG Brush Grade Supplement.



B247-1

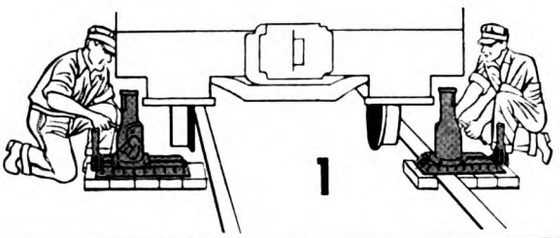
THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 13, MICHIGAN

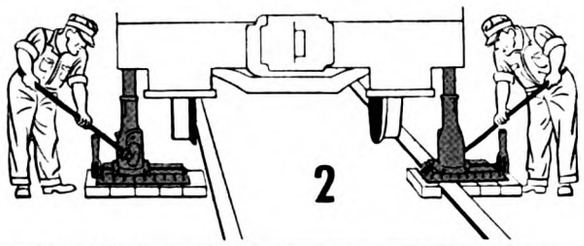
GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

How to get back on the track quickly

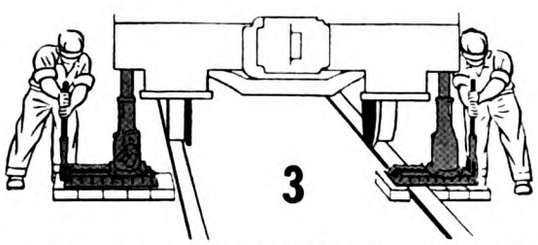
Without A Crane!



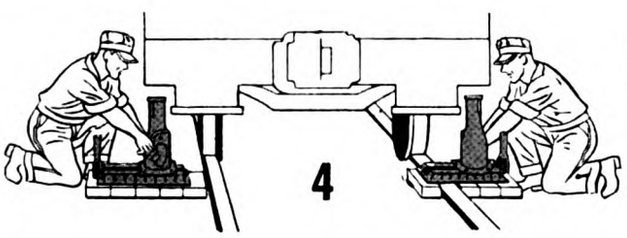
Place a *Duff-Norton traversing base* and *jack* beside each derailed truck.



Jack up the car or locomotive until wheels clear top of rails.

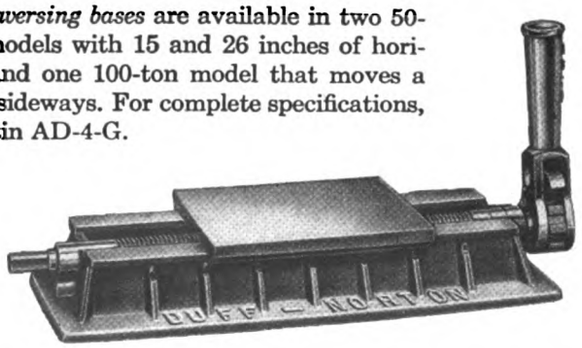


Move jacks horizontally simultaneously on traversing bases until wheels are in alignment with rails.



Lower wheels; you are back on the track, quickly, inexpensively and without danger of distorting car or locomotive frame.

Duff-Norton traversing bases are available in two 50-ton capacity models with 15 and 26 inches of horizontal travel and one 100-ton model that moves a load 20 inches sideways. For complete specifications, write for bulletin AD-4-G.



Duff-Norton Jacks

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

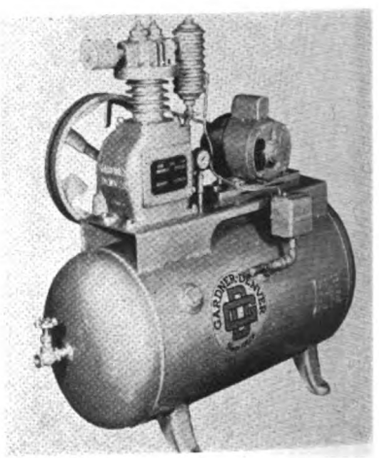
EQUIPMENT

(*Continued from page 58*)

ble system as a solution to many "special car problems," because side rails can be removed, stored and the car used for bulk loading. One man can easily handle and position a section of side rail. Rails can be removed by lifting the latches up and out in one motion.

Side rails can be extended through the doorway and removed from either inside or outside the car.

"Tri-Belt" crossmembers can be rotated in 90-degree increments about their axis to get increased holding strength in the desired direction. The manufacturer claims this ability to shift the holding strength of the cross-members means fewer members are needed to hold the load. The fittings on the cross-members are slightly off-center so they can be rotated and repositioned for closer nesting. *Sparton Corp., Tri-Belt Division, Dept. RLC, Jackson, Mich.*



Small Compressor

This unit, known as model CACB, is designed to provide oil-free air for the operation of instrument controls as well as for paint spraying. Heart of the compressor is said to be in the carbon parts in the cylinder which require no oil or water lubrication.

The single-stage, air-cooled unit is available in base or tank mounted designs. It supplies 4 to 5 cu ft of air per min and is suitable for discharge pressures of 40 to 100 psi. Automatic start and stop controls are supplied as needed. *Gardner-Denver Company, Dept. RLC, Quincy, Ill.*

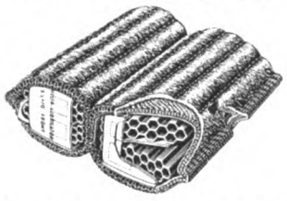
Table Saw Safety Guard

This guard is a heavy duty tool which simplifies production, increases output,

(*Continued on page 62*)

FOR PROGRESSIVE RAILROADING

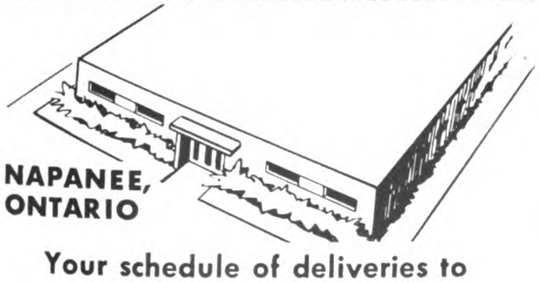
111,000 CARSETS TO DATE



MILLER PAD LUBRICATORS

Immediate Delivery IN Any Quantity

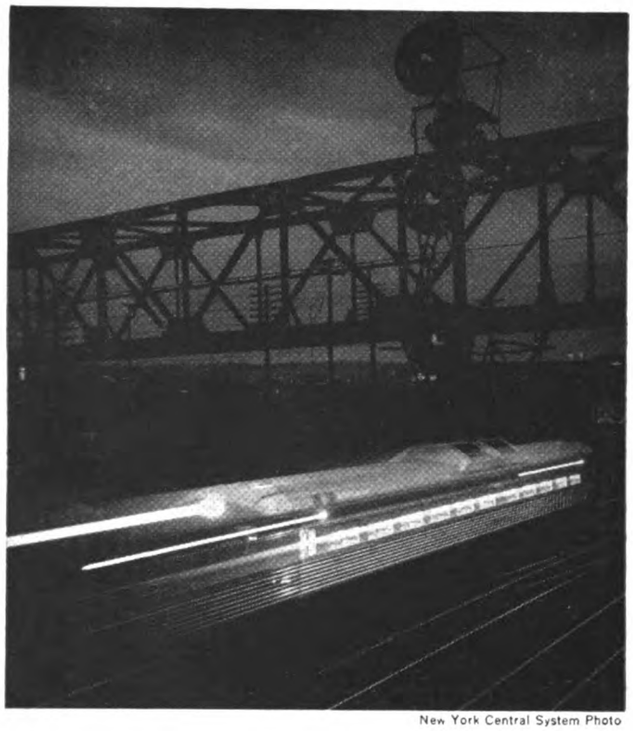
WINONA, MINNESOTA



NAPANEE, ONTARIO

Your schedule of deliveries to either plant will be met as specified.

MILLER LUBRICATOR CO.	NAPANEE IRON WORKS
WINONA, MINNESOTA	Napanee, Ont., Canada Montreal, Que., Canada



New York Central System Photo

Self-propelled, and equipped with efficiency in mind

EX-CELL-O PINS AND BUSHINGS GIVE YOU PERFORMANCE BONUS

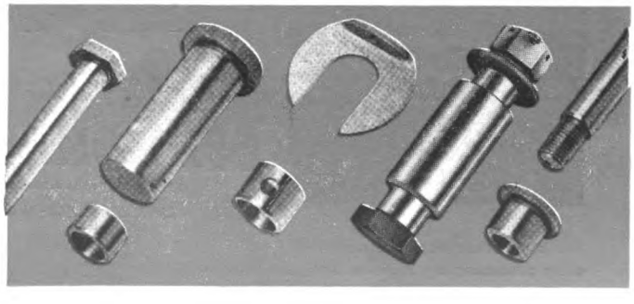
Rocketing into the night, this rail car is using safe and secure Ex-Cell-O Pins and Bushings. Why do so many railroad men count on Ex-Cell-O pins and bushings for efficiency?

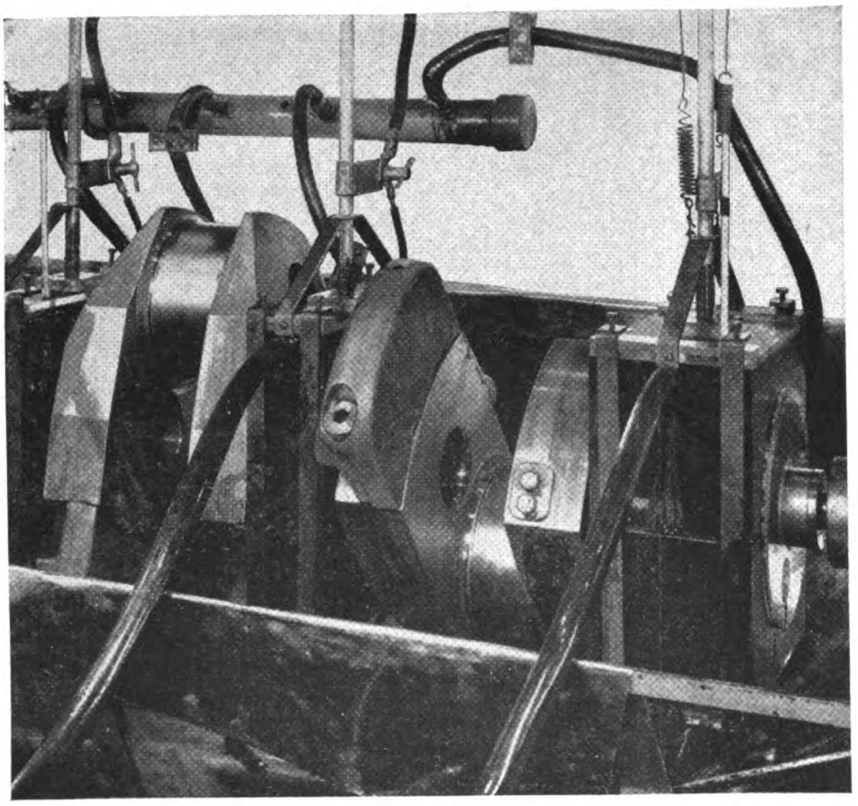
One reason is the durable outer casing that takes severe stress in stride. Another reason is the soft ductile core that takes the shock out of strain. But the best reason is that railroad men *know* every Ex-Cell-O pin and bushing often offers up to a million miles of service. Well-stocked warehouses assure express-speed delivery and an exceptional service policy guarantees satisfaction long after the sale. Available separately or assembled.

Why not contact your Ex-Cell-O Representative or Ex-Cell-O, Detroit, soon.

EX-CELL-O CORPORATION — EX-CELL-O FOR PRECISION — XLO — 57-83

RAILROAD DIVISION, EX-CELL-O CORPORATION, DETROIT 32, MICHIGAN



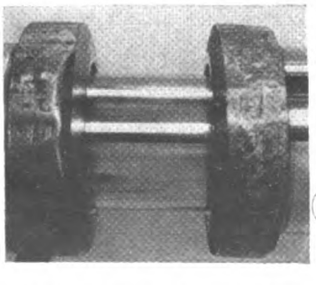


THIS REBUILT CRANKSHAFT IS CHROMIUM PLATED BY A SPECIAL NATIONAL FORGE PROCESS

When your crankshaft is reconditioned at National Forge, here's how it is chrome plated. Each bearing surface is individually boxed and plate thickness is built up only as required. Different thicknesses—over 1/8" if needed—can be added to different surfaces of the same crank. Because only the boxed surfaces are exposed to plating action the fillet areas retain their original strength.

When applied by National Forge specialists, chrome plating is uniform and smooth. Regrinding is kept to a minimum and your reconditioned crankshafts are returned to you meeting the original shaft's specifications.

No other plating company has National Forge's experience in handling both new and rebuilt crankshafts. So why not try National Forge specialists on your crankshaft rebuilding jobs?



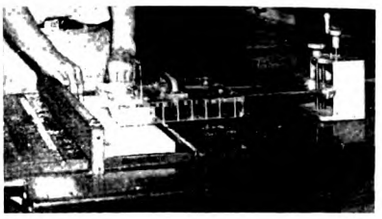
This is a finished, repaired crankshaft after processing by National Forge.

For more details on crankshaft repair, write for Bulletin RC-2.

NATIONAL FORGE
AND ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.

EQUIPMENT

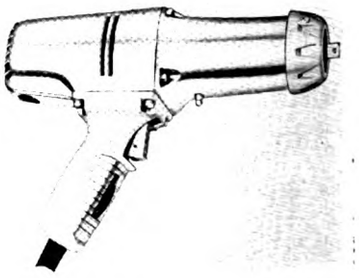
(*Continued from page 60*)



and protects fingers and eyes against crippling injuries common to circular saws. The guard is guaranteed to hold stock down against the revolving blade; hold stock on edge firmly against rip-fence; make kick-back impossible; enable the operator to clearly see as he saws; protect the operator against flying wood chips; eliminate the use for C-clamps; etc.

A transparent shield of shatter-resistant Plexiglas plastic, ½ in. thick, and covers the saw yet allows full vision for mitering, cross cutting, compound mitering, ripping, rabbeting, tenoning, dadoing, feathering, diagonal sawing, template cutting, drop sawing, plowing and tongueing.

A flick of the knob sets the guard into one of three operating positions in aligned holes in extension plates attached to the table top. The guard itself is capable of providing horizontal and vertical pressure, and can be used as an over-riding fence for angular work. *Brett-Guard Company, Division of Glenwood Industries, Inc., Dept. RLC, Englewood, N. J.*



Electric Wrench

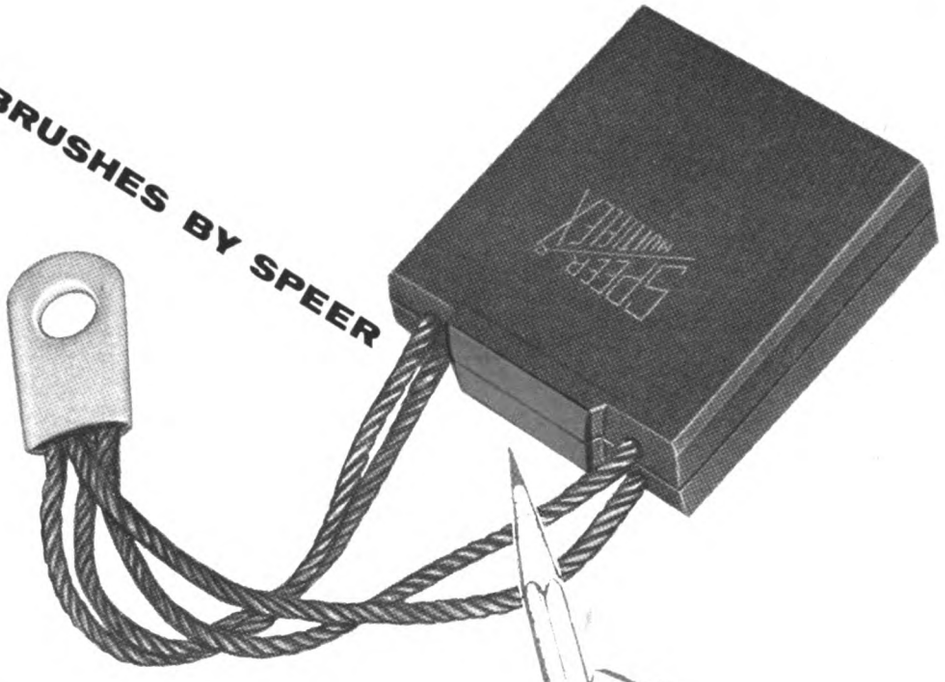
The Power Core of this impact wrench is a neoprene-steel energy accumulator, to eliminate the need for many close tolerance thrust and ball bearings, springs and cams.

Twisting the nose cap permits adjustment of the torque to the requirement of the job. The tool is designed to do the work of two wrenches—3/8 in. to ½ in. bolt capacity—with reduced operator shock.

It reaches maximum torque in 6 sec, has a torque range of 105 to 275 ft-lb and delivers 1,600 to 1,800 impacts per min. *Portable Electric Tools, Dept. RLC, 320 West 83rd st., Chicago 20.*

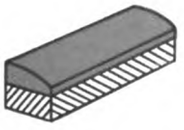
(*Continued on page 64*)

NEW "RED CAP" BRUSHES BY SPEER



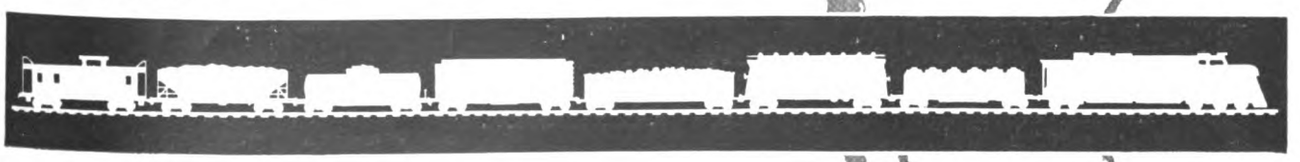
On your most rugged haul, try Speer's new "Red Cap" brushes. They are made to stand up under the toughest conditions of vibration, sudden shocks, rough roadbeds and long-haul running. Special double-duty shock absorbers take the beating...brushes themselves aren't touched. Results are longer brush life (breakage and shunt-fraying virtually eliminated), maintenance-free service, improved commutation and real long-haul reliability.

"Red Cap" brushes are yet another example of Speer's leadership in brush design. There's a Speer brush exactly right for every railroad application. Write today for details.



How "Red Caps" Work

Specially designed hard rubber cap, laminated to softer neoprene pad, is mounted at top of brush. Initial impact of vibration and shocks is broken by hard cap. Design insures even distribution of remaining pressures over entire surface of soft underpad, allowing full absorption of vibration and shocks with minimum of compression. Hard cap also resists wear and indention by spring finger, permitting free movement and most efficient operation of brush throughout its life.



SPEER Carbon Co.
St. Marys, Pennsylvania

EQUIPMENT

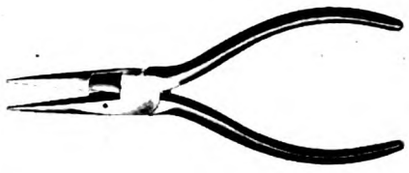
(*Continued from page 62*)

Plier Speeds Wiring

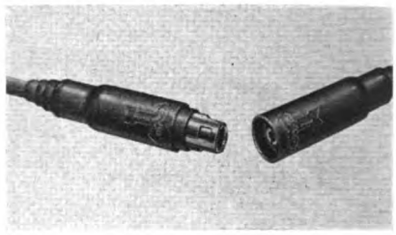
The long nose plier illustrated is designed to speed up wiring where the cut, hook and crimp method is employed.

Acting on a shear principle, this plier cuts hard or dead soft wire cleanly. The shear blade is removable and may be easily replaced if it becomes worn.

The reverse side of the plier has a milled section behind the knife so designed that when the wire is cut, it is



held in position and a turn of the hand forms a hook in one operation. This is particularly desirable when wiring in resistors. Resistor wires may be cut to length, the hook formed and the hook closed all with the same tool. It is furnished with a self-opening coil spring and 1/16-in. diameter point. *Mathias Klein & Sons, Dept RLC, 7200 McCormick Road, Chicago 45.*



Attachable Welding Plugs

There is now available a new, low-cost set of connectors (mating male and female plugs) for use in welding cable leads and welding whips. Supplied in one size only, that can be quickly attached to all cable sizes from #4 through #4/0 AWG, these units have a maximum welding service rating of 550 amp. A few of the outstanding features reported by the manufacturer are watertight Neoprene insulating sleeves, —positive twistlock connections, and distortion-proof construction. *Joy Manufacturing Company, Electrical Products Division, Dept. RLC, 1201 Macklind ave., St. Louis 10, Mo.*

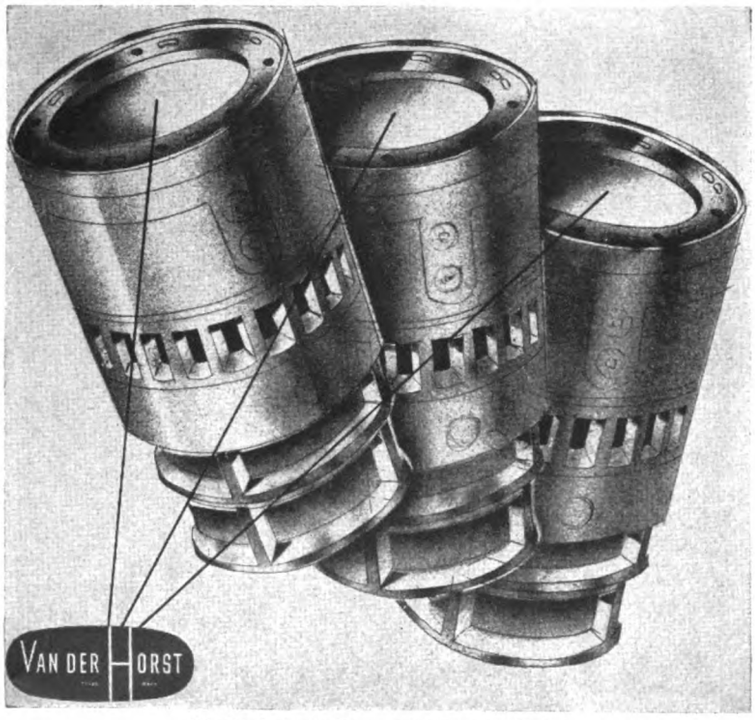
Tape Is Both Insulation and Sheath

A new electric tape is now being offered which is designed for splicing and terminating either plastic or rubber cables and which, under 2,000 volts, serves as both insulation and sheath. The tape possesses optimum electrical characteristics, and is also resistant to weather, chemicals, flames and mechanical abuse. It is made in five colors for phase and circuit color-coding.

Under application, the tape rapidly fuses into a solid, homogeneous wall around the connection. No adhesives are involved. Known as Okoweld, the tape is made by the *Okonite Company, Dept. RLC, Passaic, N. J.*

(*Continued on page 66*)

5 *big advantages of*



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Good for the Life of your Engines

- INCREASES CYLINDER LIFE 3 TO 5 TIMES.
- INCREASES PISTON RING LIFE UP TO 50%.
- ELIMINATES STOCKING OF OVERSIZED PISTONS AND PISTON RINGS.
- DEFINITELY CONTRIBUTES TO REDUCED DOWNTIME FOR ENGINES.
- DEFINITELY CONTRIBUTES TO A REDUCTION IN LUBE OIL CONSUMPTION.

—Write Dept. B, VAN DER HORST CORP., OLEAN, N. Y.—

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VAN DER HORST

TERRELL, TEXAS
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*SparTan Engineering

On its second fleet of 70 GP 9 locomotives

Illinois Central again equips diesels with Air-Maze oil bath filters

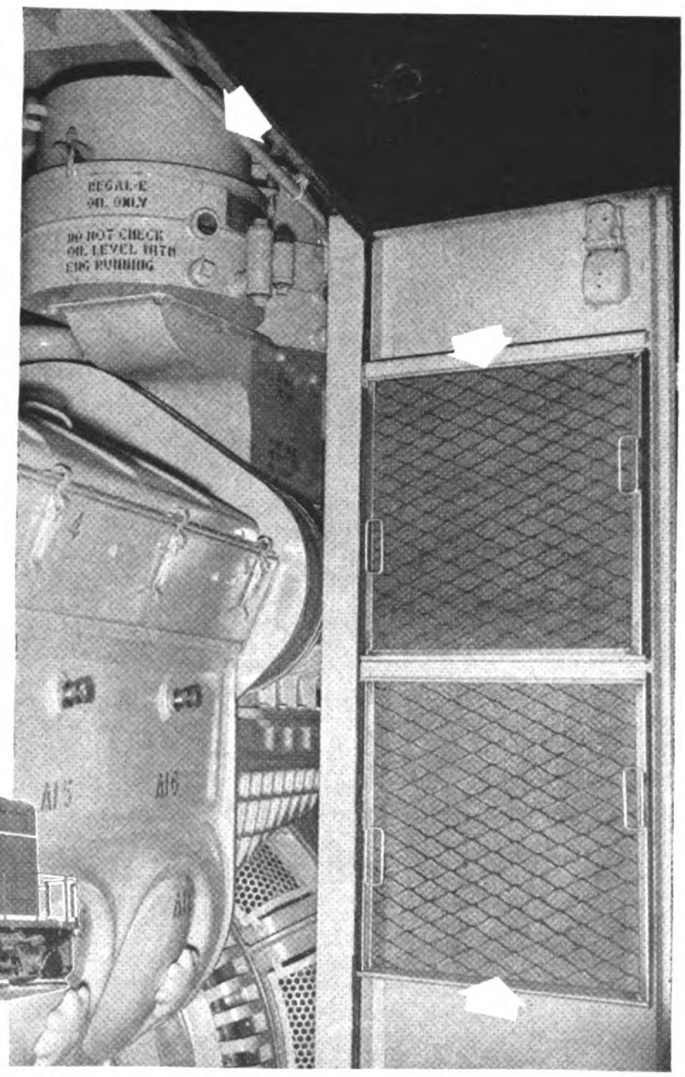
The reason is simple... longer wear from cylinder liners, pistons and rings; less cost for fewer repair parts and fewer maintenance manhours.

This is the record *after two years' testing* of oil bath filters on switchers, road switchers, and passenger locomotives.

And this is the reason why the second fleet of 70 diesels like the first fleet... 245,000 horsepower in all...is completely protected with Air-Maze oil bath filters.

Actually 59% more fine dust is removed by Air-Maze oil bath filters than the next best filtering device. And by filtering the air in a bath of oil, high filtering efficiency of the oil bath filter is maintained even at lowest engine speeds.

What's more, the oil bath filter operates 3 months or longer with minimum maintenance.



For information write your locomotive builder, or Air-Maze Corporation, Cleveland 28, Ohio, Dept. RL-10.

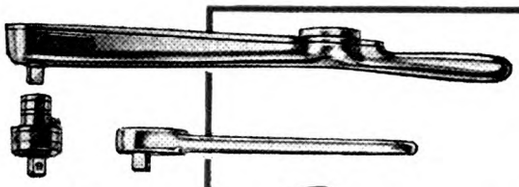
Oil bath filters *(upper left) maintains 92% efficiency or better in cleaning intake air in a bath of oil.*

PSRR car body filter panels *(upper right) also used on this railroad to pre-filter air going to engine, traction motors, compressor, and generator.*

AIR-MAZE
The Filter Engineers

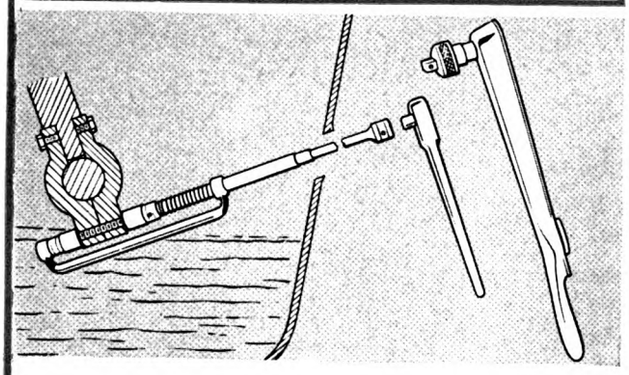
GEARED TO PROGRESS
RI
MEMBER

ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • PASSENGER CAR FILTERS



NEW

Snap-on* BASKET BOLT WRENCH



This special wrench N6057 reaches right through a port, connects to the bolt head and nut with little effort and is held firmly in position by spring tension. Drive sockets hold to the tool by means of a special locking pin device to prevent their dropping into the crankcase. The ½-inch square drive handle end is turned with a *Snap-on* ratchet wrench or sliding tee handle and can be torqued with a *Snap-on* Torqometer.

lets one man do the work of two, safely

Now a new *Snap-on* tool makes it possible for one man to handle hard-to-reach cross bolts at the bottom of new-type E.M.D. connecting rod baskets.

You can't miss with this new *Snap-on* special. It will prove to be a definite asset in your shop — making a slow, tough two-man job a safe, simple and fast one-man operation.

Here's a typical example of how the *Snap-on* railroad specialist can solve your problems. He has many tools like the basket bolt wrench, plus complete sets to speed many railroad repair and maintenance jobs.

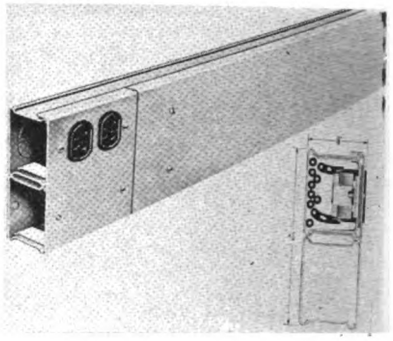
Write for your copy of the *Snap-on* railroad tool catalog.

SNAP-ON TOOLS CORPORATION
Railroad Division • **8130-J 28th Avenue, Kenosha, Wis.**

*Snap-on is the trademark of Snap-on Tools Corporation.

EQUIPMENT

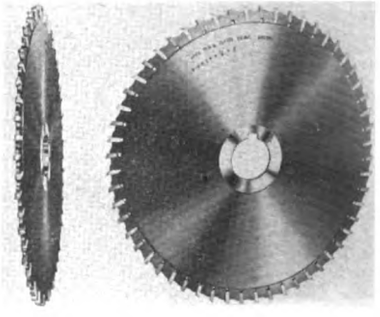
(*Continued from page 64*)



Raceway for High-Low Voltage Wiring

The product shown is a new metal surface raceway designed to carry both high and low potential conductors in a single run. It is called Twinduct and provides two separate 2-in. x 2-in. raceways for wire with a single screw-on cover. It incorporates the lay-in, no-fishing, principal of wiring.

Covers are available to adapt to any manufacturer's approved outlet devices up to 20-amp capacity. With devices, the system becomes an economical and efficient feeder duct. It is manufactured in 10-ft lengths, with half and three-quarter-in. knock-outs and mounting holes on 15-in. centers in the base. Bridges are furnished with each 10-ft section. The combined twin-raceway's overall measurement is 1⅝ in. deep x 4¼ in. high. *National Electric Products Corporation, Dept. RLC, Gateway Center, Pittsburgh, Pa.*



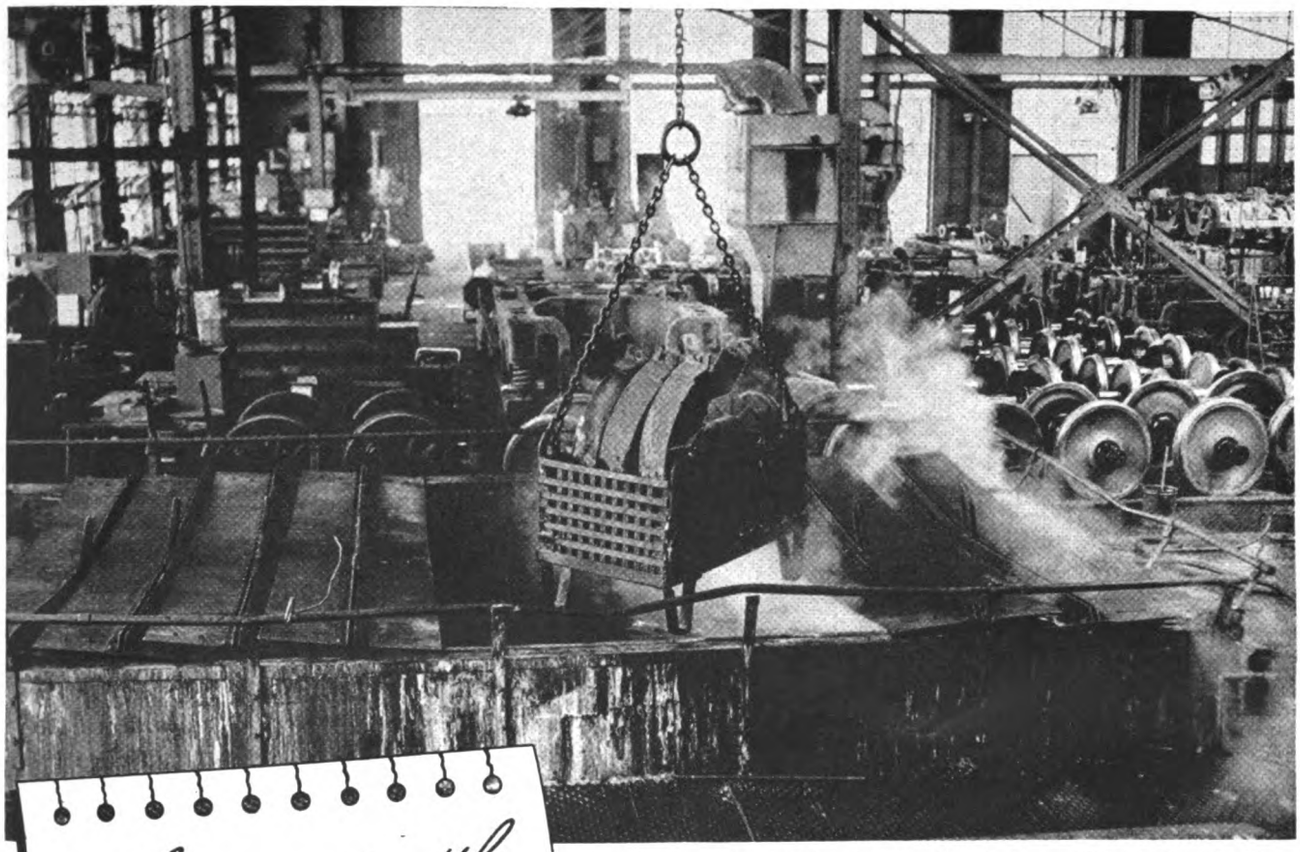
Milling Cutters

A line of thin alternate angle, free-cutting milling cutters for sawing or making narrow, accurate slots is made with tapered, serrated, self-locking blades. Blades are forged, high-speed steel, scaled down for narrow operations. Their reinforced bodies are forged of nickel-alloy steel.

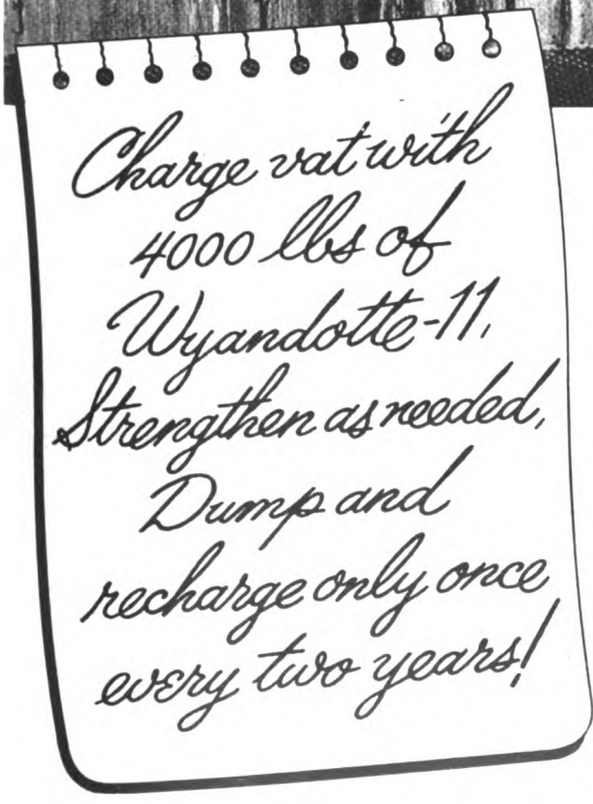
Ground blade faces, and ample chip room are said to result in a free cutting action unequaled by regular slotting cutters. Replaceable blades range in diameter from 3 to 24 in., and in widths from 3/16 to ¾ in. *Apex Tool & Cutter Co., Dept. RLC, Shelton 22, Conn.*

(*Continued on page 68*)

How the C&O cleans diesel parts with Wyandotte-11



Besides saving with low-use-cost Wyandotte-11, C&O cuts down heat loss and steam costs through use of a cover. Cover plates may be lifted, or pushed back, overlapping each other.



THE 50,000-GALLON VAT AT C&O's HUNTINGTON, W. VA., SHOP is one of the largest of its kind in the East. Into a boiling solution of 4,000 lbs. of Wyandotte-11 Vat Cleaner, the C&O lowers diesel wheels, trucks, gear case covers, and many other hard-to-clean parts.

Results are excellent – have been for years! That's why the C&O, long famous for good housekeeping, has used free-rinsing, 100%-soluble Wyandotte-11 since even before the advent of diesels. From cleaning steam-locomotive trucks to heavy air-brake parts, Wyandotte-11 has given good emulsification, controlled uniform quality, long service life.

Take a look at *your* cleaning operations: see if Wyandotte-11 might not help you clean better, faster. Or maybe your Wyandotte representative can show you how to use some other research-developed, low-use-cost Wyandotte cleaner for your particular job. Call him *today! Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

Wyandotte CHEMICALS

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J. B. FORD DIVISION

COMPLETE LINE OF CLEANERS FOR ALL RAILWAY NEEDS

FRAHM® and JAGABI®
Speed Measuring Instruments
. . . to meet every requirement
Write for Bulletin 35-X

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ALWAYS SPECIFY

MEGGER®
Electrical Resistance
Measuring Instruments
. . . for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.
Write for File RR #1

EQUIPMENT

(*Continued from page 66*)

Power for Electro Magnets

The electric plant shown is designed especially for electric magnet operation. It is a d-c air-cooled unit which provides ample capacity for 39-in. and 45-in. magnets. Dimensions and weight have been kept to a minimum and the compact design of the plant permits ready installation on cranes of all sizes. The generator is a 7.5-kw, 230-volt d-c, 4-pole unit with compound winding. Power to operate the generator is supplied by a short stroke, air-cooled, 4-cycle engine, developing 20 hp at a governed speed of 2,400 rpm. The plant features push-button starting. *Kohler Company, Dept. RLC, Kohler, Wis.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

VALVES AND CYLINDERS. Two-color folder, "The Complete Line," features models in the 1,000 standard Rivett line. Illustrations and line drawings show keeper ring and tie rod designed cylinders and directional and functional flow valves. Each type of air or hydraulic valve and cylinder shown in cross-section. Mounting styles and connections, such as pipe, flange or subplate mounted, also illustrated. (Write: *Rivett, Inc.*, Dept. RLC, Brighton 35, Boston.)

OIL-FIRED HEATERS.—Bulletin No. 460 contains pictures and descriptive

America's foremost engineered lettering tools
designed to reduce your present costs
50 to 80%
Used today by 1/3rd of the Nation's leading Railroads . .
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Spray it-
STENCILS
PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100
THE DEMP-NOCK COMPANY
21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.
DEMP NOCK

data on oil-fired Caban heaters for heating cabooses, small depots and shops. (Write: *Vapor Heating Corporation,* Dept. RLC, 6420 West Howard st., Chicago 31.)

TRUCK PINS AND BUSHINGS.—23-page booklet contains complete ordering information on truck pins and bushing for all General Motors locomotives. Phanton drawings of each type of truck show pin and bushing locations. (Write: *Sales Promotion Section, Electro-Motive Division, General Motors Corporation,* Dept. RLC, LaGrange, Ill.)

INDUSTRIAL EQUIPMENT.—Catalog illustrates and describes in detail standard, storage equipment such as adjustable steel shelving, revolving bins, and cabinets, and lists such material-handling and specialized equipment as shelf trucks, stair-climbing trucks, aluminum ladders, work benches, waste receptacles, etc. (Write: *Precision Equipment Company,* Dept. RLC, 4411B Ravenswood ave., Chicago 40.)

HOUR METERS.—12-page catalog, No. 600, describes Hobbs direct current hour meters which record actual hours and minutes of engine operation on all kinds of equipment powered by internal combustion engines, gasoline or diesel. (Write: *John W. Hobbs Corporation, a Division of Stewart-Warner Corporation,* Dept. RLC, 1826 Diversey Parkway, Chicago 14.)

FOR SALE

FAIRBANKS, MORSE CO. — OPPOSED PISTON DIESEL ENGINE SPARE PARTS
NEW-UNUSED — BIG SAVINGS

Crankshafts (Upper & Lower)
Blowers
Vertical Drive Assembly
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Many other parts

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Ph. Digby 9-4350

California Address
Ft. Spring Street
Sausalito, Calif.
Ph. Edgewater 2-1490

FOR SALE

New General Electric Traction Generators

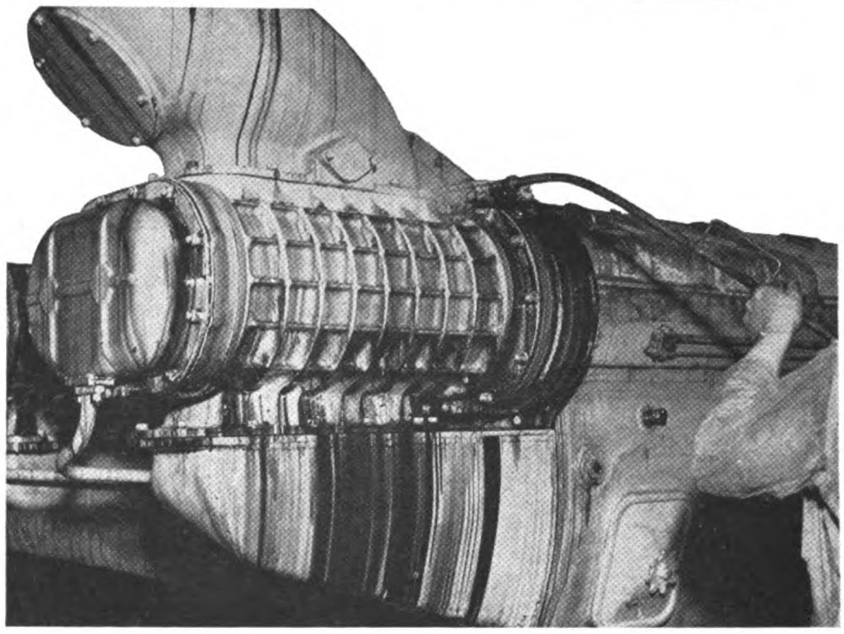
Manufactured 1955 and 1956—
Never installed—With Exciters

7 Model GT-591-A 1200 HP
15 Model GT-590-A1 1600 HP

— wire or phone collect —

C. Kirk Hillman Co., Inc.
3201 First So. Eliot 6561 Seattle 4, Wash.

the PROOF is in the DOING !



Prove to yourself, in your own shop, how you can

SAVE TIME
and
CUT CLEANING COSTS

with LIX DIESEL KLEAN HEAVY!

Lix cleans dirty engine parts BRIGHTER THAN NEW . . . and cleans them FASTER! Pistons, cylinder heads, bearings, fuel filters, brush holders, air brake assemblies, etc. are cleaned more thoroughly, and with a minimum of hard labor. No brushing or scraping . . . just soak the parts in Lix and rinse with water or mineral spirits. Lix is harmless to all metals during the cleaning cycle, and you can clean all types of metals in one tank. Lix is SAFER, too — tests conducted by one of the nation's leading research laboratories prove that it is of low toxicity, and because of its high flash point it is not a fire hazard.

Because of its long life without frequent charges, Lix Diesel Klean Heavy is far more ECONOMICAL in the long run than "less expensive" cleaners. This is one of the reasons why more and more railroads are relying on LIX.

WRITE, wire or phone for a no-cost, no-obligation DEMONSTRATION in your shop. See how you can do a BETTER locomotive-cleaning job . . . FASTER, MORE SAFELY and at LESS COST!

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix CORPORATION
(OF MISSOURI)
300 WEST 80TH, DEPT. RL10
KANSAS CITY, MISSOURI

PRODUCTS OF RESEARCH

"Leadership in Industrial Cleaning"

LESS THAN A SPOONFUL OF FUEL IS LOST

. . . with the NEW ROYLYN DIESEL FUELING VALVE

Make every drop of fuel count in road mileage . . . actual road tests have proved that less than a spoonful of fuel is lost during each fueling operation with Roylyn equipment. **STOP WASTE NOW**... Specify Roylyn "Non-Spill" Valves.

Roylyn Valves not only save **FUEL,** but also save **TIME, MANPOWER** and **MAINTENANCE.**

Waste Fuel on or about loading facilities is always a triple-threat menace ... **A FIRE, ACCIDENT** and **DISPOSAL PROBLEM FOR YOU.**

FOOLPROOF AND FREE-FLOW OPERATION . . . (1) Prior to engagement (2) Engaged with Valve Closed (3) Valve Open and Clear Fuel Flowing.

Here's What This Equipment Will Do For You . . .

- ELIMINATE SPILLAGE OF FUEL
- LOWER MAINTENANCE COSTS
- LOWER EQUIPMENT COSTS
- REDUCE FIRE AND ACCIDENT HAZARDS
- MINIMIZE FACILITY CONTAMINATION
- IMPROVE PUBLIC RELATIONS

ROYLYN R RAILROAD PRODUCTS

Write for your copy of Brochure fully describing Roylyn's "Non-Spill" Coupling-Valve!

AIRATERRA

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CHapman 5-1196 • CItrus 2-1146 • TWX 7158 WUX

FOR RELIABILITY . . . SPECIFY ROYLYN RAILROAD PRODUCTS

Diesel Ideas

(*Continued from page 38*)

ing, contraction seals the water space and the complete assembly goes on for further reclamation in PRR's Altoona shop.

Testing . . . Lash Adjustors

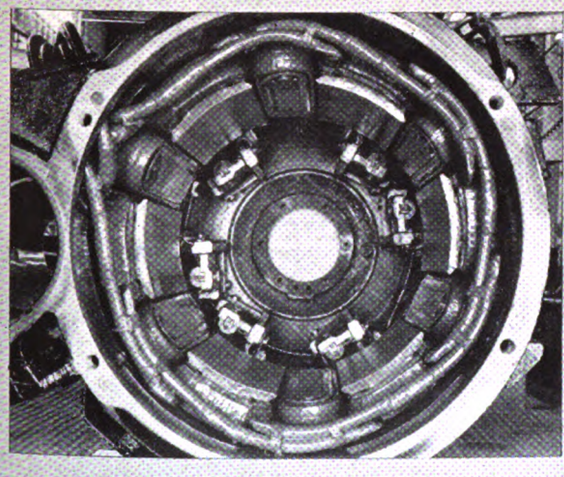
Pressure applied to lash adjustor with arbor is measured on scale at Union Pacific's Omaha shop. When 60 psi is reached, set screw is tightened to check that pressure does not go below 40 psi in 30 sec. Oil is kept at 90 to 95 deg.

Cleaning . . . Power Assemblies

Welding positioner, hold-over from steam days at Chicago & Eastern Illinois' Danville shop, has been powered with 1-hp motor and foot control. Port openings and seats are cleaned twice as fast and much more safely, according to C&EI.

Here's why NATIONAL Plastic Molded COPPER-CLAD Field Coils

Insure Longer Service Life



The main illustration shows a plastic molded, copper-clad interpole field coil for a railway traction motor. The small photo shows a set of such coils assembled with main field coils of the same construction in a traction motor frame. For details on how National plastic molded, copper-clad field coils can help reduce your motor maintenance problems, just drop us a line or call your nearby National field engineer.

1. Snug fit on pole piece eliminates coil movement and provides maximum heat transfer to the frame.
2. Monolithic construction resists damage from mechanical stresses and insures maximum heat dissipation.
3. Void-free insulation prevents penetration of oil, moisture and other deteriorating agents.
4. Proven heat-resistant impregnant imparts high temperature endurance.

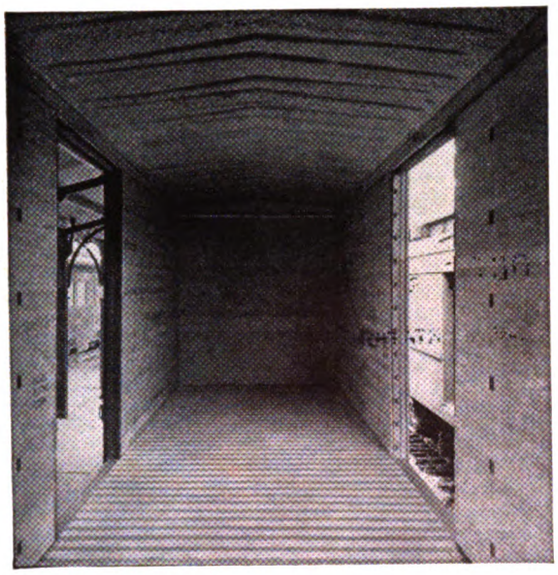
NATIONAL ELECTRIC COIL COMPANY

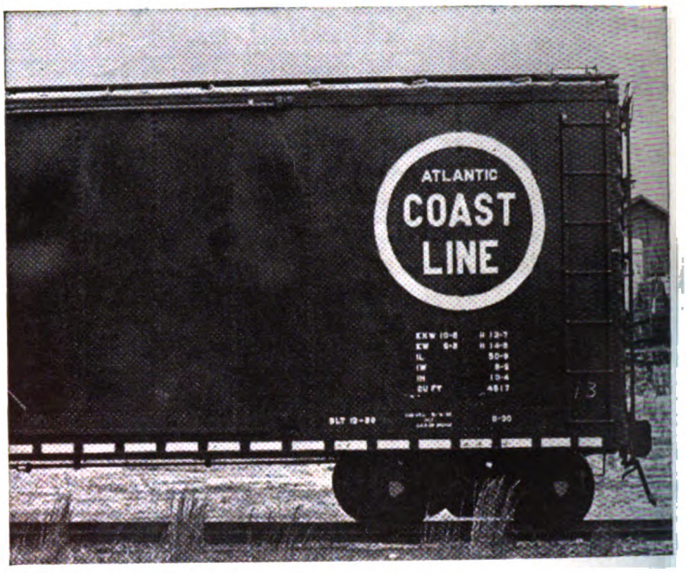
COLUMBUS 16, OHIO, U. S. A.

TRADE MARK

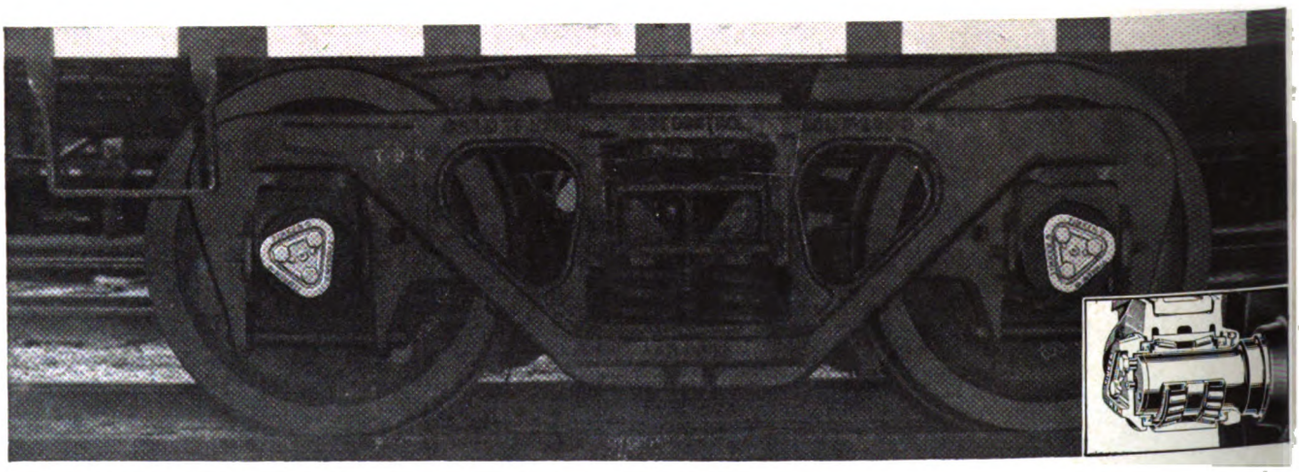
ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

INSIDE... AND OUT





ACL's 500 new-design box cars have everything a shipper wants including Timken® roller bearings



TO provide shippers with the best possible freight service, Atlantic Coast Line recently put into service 500 of the strongest box cars ever built. Vermin and splinter-proof floors, reinforced steel frames and roofs, special anchoring devices are all of the latest design to give freight maximum protection.

These new cars are for the fastest scheduled freight run in the country. To make sure they meet schedules, ACL specified Timken® tapered roller bearings. With Timken bearings, ACL licks the hot box problem, No. 1 cause of freight train delays. Full speed can be maintained. And trains will move through terminals faster. It takes only a touch to inspect Timken bearings—cutting terminal bearing inspection time 90%.

With over 7,000 cars on Timken bearings, ACL is America's leading "Roller Freight" railroad. When all railroads go "Roller Freight", they'll save an estimated $224,000,000 in reduced operating and maintenance costs —give better service than ever. The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

NOV 14 1957

...gled in 1832

RAILWAY LOCOMOTIVES AND CARS

NOVEMBER 1957

A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION

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TRANSP RTATION

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OUTSTANDING RECOMMENDATIONS FOR HIGH OPERATING EFFICIENCY

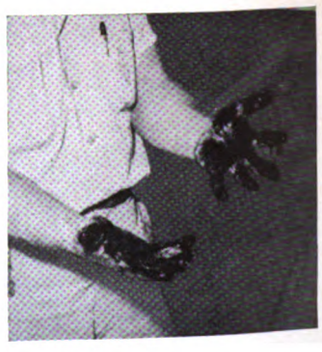
LASS A-22-XL

LASS RF-333

The Miner Class A-22-XL Friction Draft Gear and Miner Class RF-333 Rubber-Friction Draft Gear fulfill every requirement for efficient performance in freight train operation and are approved for unlimited application to cars in interchange.

W. H. MINER, INC. CHICAGO

NO MORE DIRTY HANDS. Texaco Crater "in the bag" simplifies traction motor gear lubrication, saves time and money.



New Texaco Crater Package

. . . just drop in bag and all

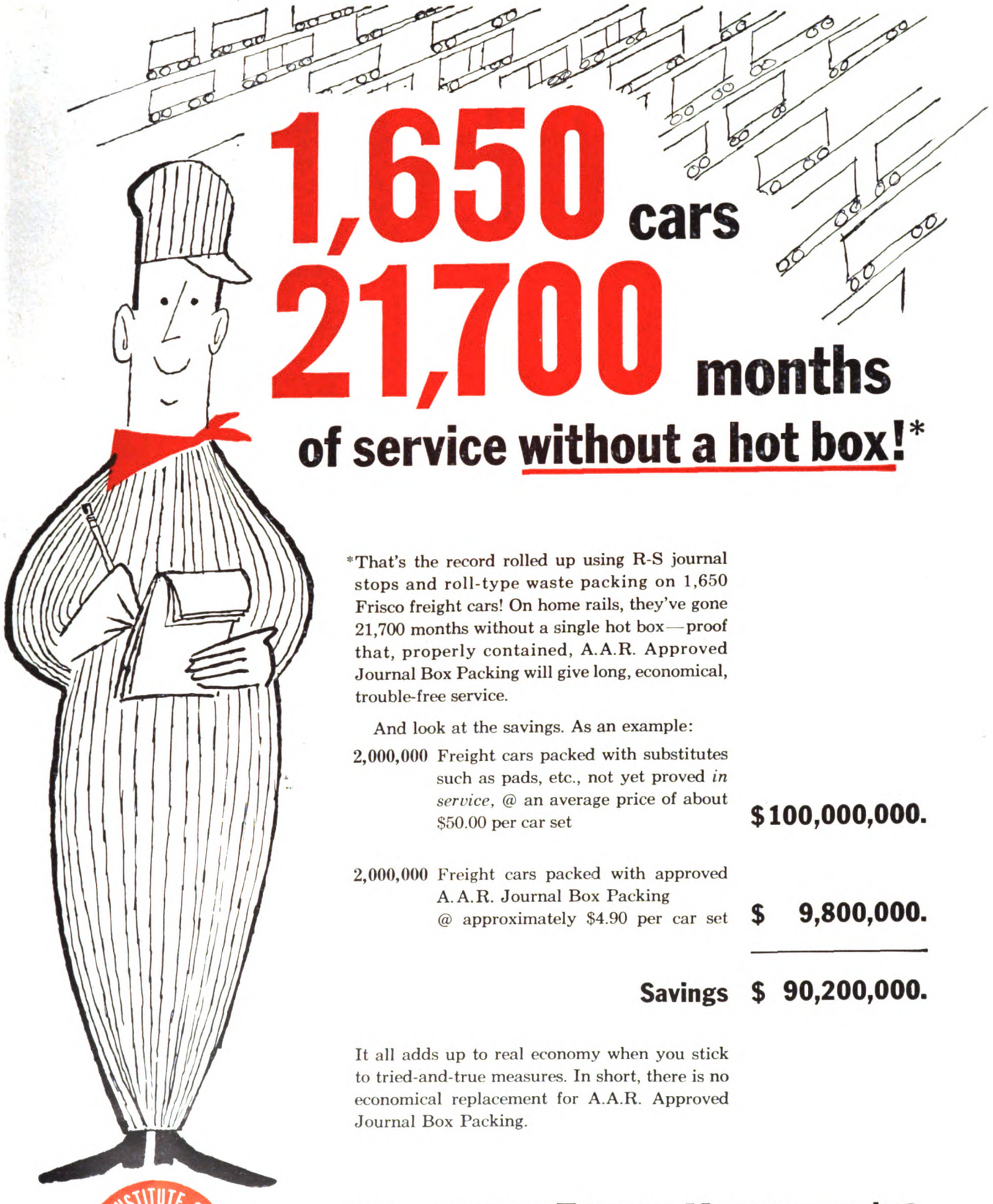
Texaco Crater now comes in new polyethylene bags that reduce traction motor gear lubrication to one, simple motion. You just drop in bag and all.

Each bag contains a measured 1-lb. charge of Texaco Crater that delivers the lubricant directly to working gear surfaces. These small, easily-handled units reduce make-up servicing time, application time, and put an effective check on old-style wasteful application practices.

Texaco Crater's new Drop-in Package comes 48 to the case. For full information, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, N. Y.

RAILROAD LUBRICANTS AND SYSTEMATIC ENGINEERING SERVICE



1,650 cars
21,700 months
of service without a hot box!*

*That's the record rolled up using R-S journal stops and roll-type waste packing on 1,650 Frisco freight cars! On home rails, they've gone 21,700 months without a single hot box—proof that, properly contained, A.A.R. Approved Journal Box Packing will give long, economical, trouble-free service.

And look at the savings. As an example:

2,000,000	Freight cars packed with substitutes such as pads, etc., not yet proved *in service*, @ an average price of about $50.00 per car set	**$100,000,000.**
2,000,000	Freight cars packed with approved A.A.R. Journal Box Packing @ approximately $4.90 per car set	**$ 9,800,000.**
	Savings	**$ 90,200,000.**

It all adds up to real economy when you stick to tried-and-true measures. In short, there is no economical replacement for A.A.R. Approved Journal Box Packing.

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Miller Waste Mills, Inc., Winona, Minn.
National Waste Company, New York, N. Y.
O'Neill Brothers, Inc., Philadelphia, Pa.
The Pittsburgh Waste Co., Inc., Swissvale, Pa.
Riverside Mills, Augusta, Ga.
Royal Manufacturing Company, Perth Amboy, N. J.
Southland Manufacturing Co., Inc., Norfolk, Va.
Twin City Textile Mills Waste Co., St. Paul, Minn.

Baldwin wheel press assembles wheel sets in as little as 2 minutes

Baldwin and Niles railroad tools are cutting shop costs drastically in the nation's leading railroads. The wheel press pictured above, recently installed in Seaboard Air Line's new shop at Hamlet, N.C., can assemble wheel sets in as little as 2 minutes. Axles and wheels are supplied by gravity racks to the press, which can be fed by one man. One assembly man and a press operator are all the manpower required to process the sets.

The Baldwin wheel press also eliminates substantial installation costs. Due to the fact that the carriage has its own built-in elevator, the machine can be accommodated by a pit only 6 in. below the floor line—in contrast with pits 6 or more ft. deep required for conventional equipment. Other efficient B-L-H railroad machine tools in operation at Seaboard's Hamlet shop include a new Niles wheel borer with sidehead, a Niles wheel lathe, and a specially designed Niles axle turning and burnishing lathe.

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TIME-SAVING IDEAS FOR **NOVEMBER 1957**

Volume 131 • No. 11

MOTIVE POWER AND CAR

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Who Is "They"? — 25
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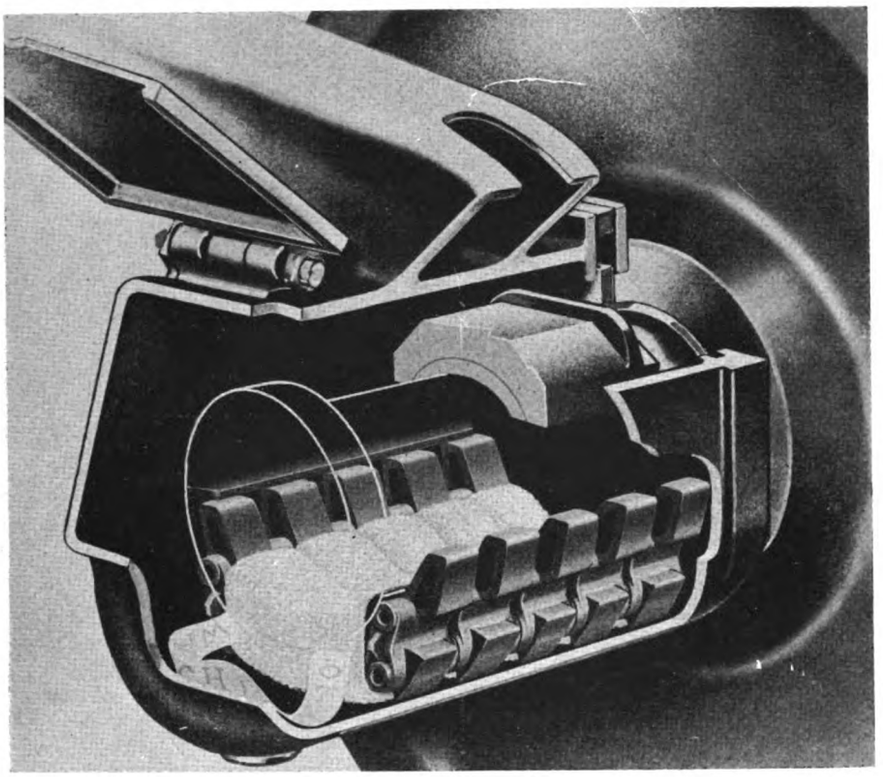
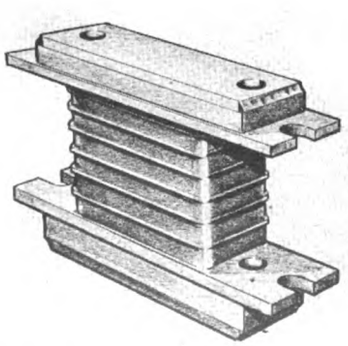


Separable Journal Lubricator

Waughpak, a separable journal lubricator comprised of a fabric jacket and molded rubber fillers, has been approved by the AAR. Five arched molded rubber fillers inserted in loops in the fabric jacket serve to hold the lubricating pad firmly against the face of the journal while the loops, themselves, provide a series of wicks across the entire face for rapid and constant lubrication.

Features claimed for this lubricator are positive wicking; freedom from glazing; cool operation; oil saving; ease of application and removal; and uncomplicated cleaning. There are no metal parts which could score the journal. *Waugh Equipment Company, Dept.* RLC, 420 Lexington ave., New York 17.



Traction-Motor Nose Mounting

A traction-motor nose support mounting for use on standard railroad traction motors, has been developed, which resists high shock loads. The mounting consists of specially compounded environmental resistant elastomer bonded to steel plates. The one-piece construction eliminates assembly and replacement of parts.

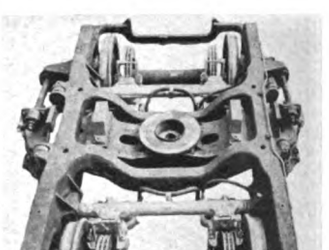
The mounting will not bottom-out under high shock loads, providing greater protection to the motor and motor housing. Pre-loading holds the mountings snugly in place.

This new bonded rubber mounting is interchangeable with present suspension systems. *Lord Manufacturing Company, Dept. RLC, 1635 West 12th st., Erie, Pa.*

Powdered Descaler

Drycid, an inhibited acidic descaler and deruster in powder form, is dry until it is to be used. Then water is added. Once in solution, the material dissolves rust and water scale the same as any liquid acid would. It ships and stores like any powder. It doesn't have to be shipped in carboys, which require special handling and must be returned when empty, and no deposit is required for container.

In solution the material gives off only a mild aromatic odor. Its inhibitors protect metal during descaling and derusting. During limited exposure, the descaler has no injurious effect on steel and copper, and can be used with greater safety on aluminum, brass and galvanized surfaces. With Drycid, systems containing dissimilar metals can be descaled with a greater measure of safety than has been possible in the past, according to the manufacturer. Drycid has application wherever water scale, iron sulphide, rust or other metal oxides must be removed. When ready to use, it is added to water and stirred. The usual proportion is 8 oz per gal of water. For best results solution is heated 140 to 160 deg F. *Oakite Products, Inc., Dept. RLC, 19 Rector st., New York 6.*

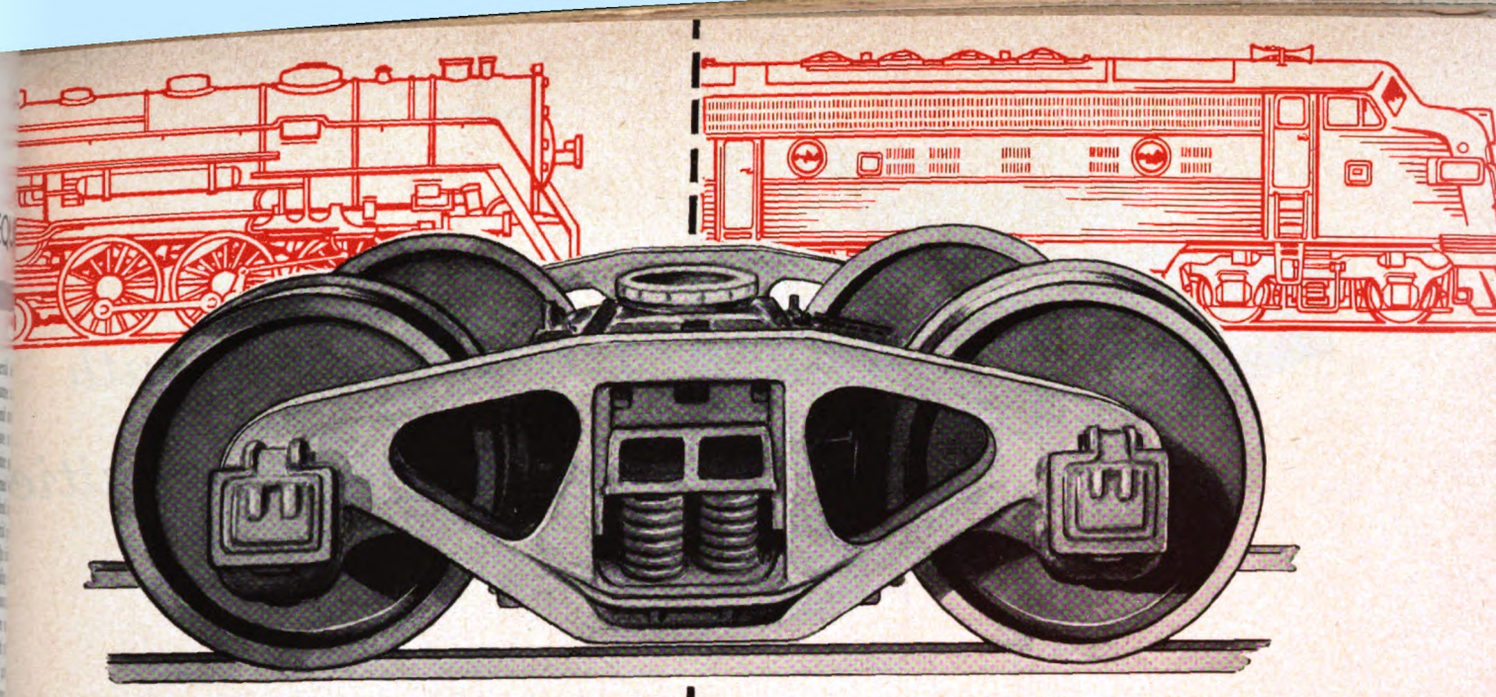


Disc Brake

The TFM (truck frame mounted) brake is a passenger-car disc brake applicable to passenger-car trucks now in operation. It was designed to accommodate a variety of wheel bases, journal centers, and frame arrangements. While the Model TFM varies from the Model CF in certain components because the brake frame is mounted directly to the truck frame, it retains the fundamental features of the Budd Model CF. For new construction the brake can be mounted by providing the necessary support lugs or bosses as an integral part of the truck-frame casting and for brake conversion by providing an intermediate support to be rigidly attached to the truck frame.

The majority of the components used on the Model TFM, such as pins, bushings, tongs, shoes and cylinders, are identical to and interchangeable with

(*Continued on page 10*)



'he Old and the New..

from waste to

-Great Step Forward!

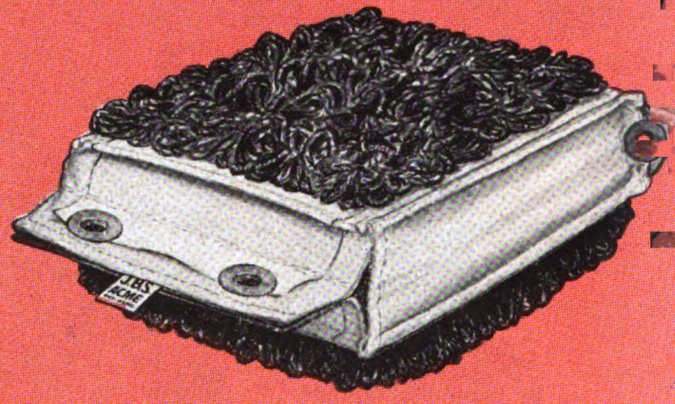
th waste gradually being discontinued in jour- lubrication, the change-over to a better type of ricator raises certain questions: what type uld it be; what qualities should it possess; what d of a performance should be expected of it? help you decide, consider what the JBS Acme bricator offers and compare it with any other ricator. JBS Acme alone has the exclusive all- ol quilted core* which retains many times its n weight in oil reserve. Heavy chenille loop pile faces assure an ample supply of filtered oil at times. JBS Acme Lubricators are unaffected by nperature changes and wick AAR specification oil even at 45° below zero in road service tests. S Acme Lubricators require no modification of e standard journal box, are designed to hold eir position in the box, and assure better per- mance with less servicing.

rite Today for Detailed Information and Folder

1957—Journal Box Servicing Corp.

*Patent applied for

JBS ACME JOURNAL LUBRICATORS



- ★ Retains oil up to 4 times its own weight
- ★ Requires no modification of journal box
- ★ Wicks AAR specification car oil even in coldest weath...
- ★ Assures better performance with less servicing
- ★ Has exclusive all-wool quilted core*
- ★ Reinforced for extra wear
- ★ Cannot glaze
- ★ Readily reclaimed

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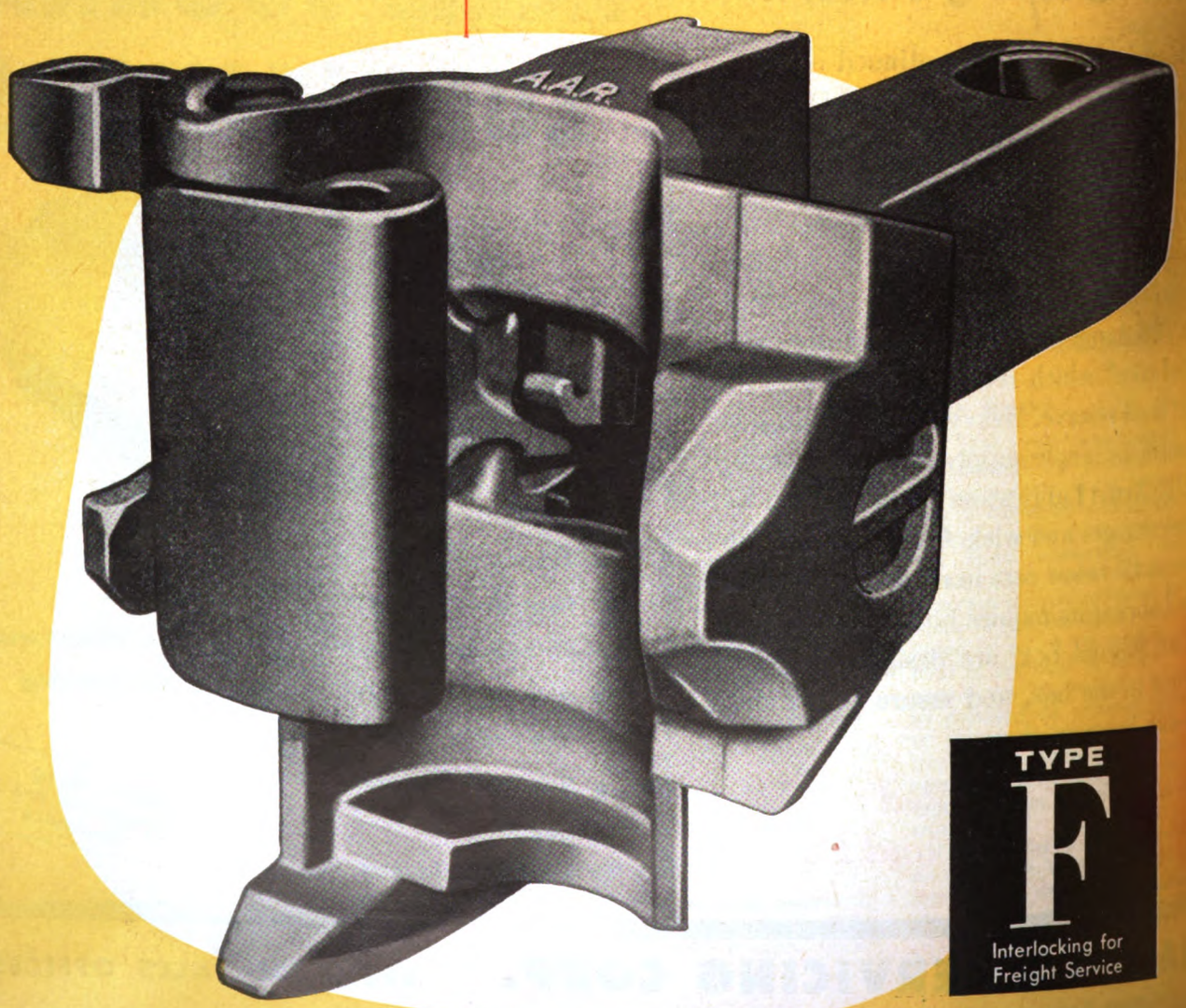

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Interlocking for Freight Service

TYPE
E
Standard for
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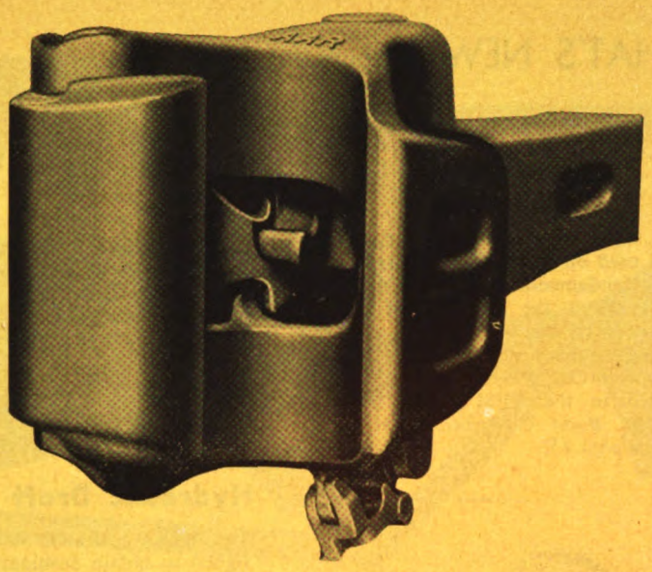
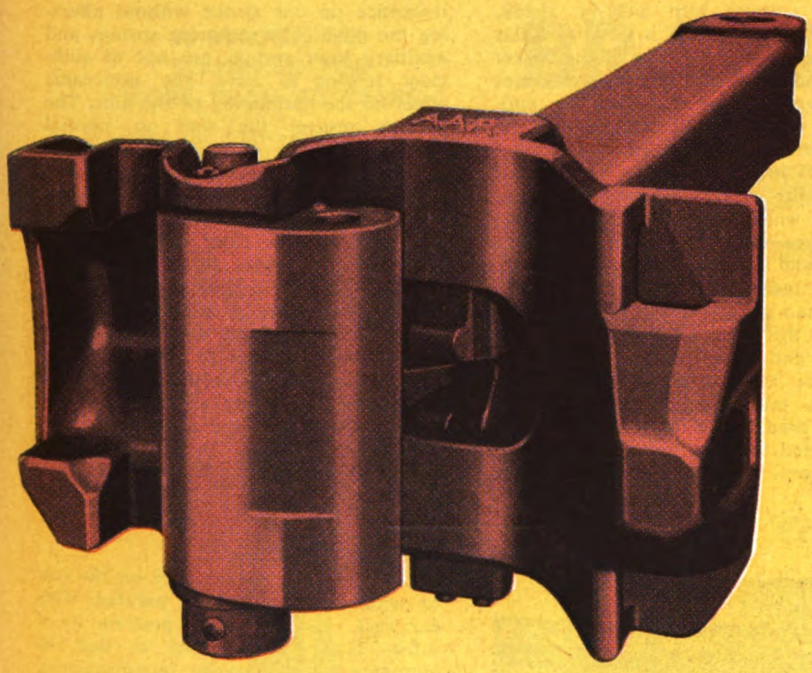


COUPLERS



The development of the automatic railroad coupler parallels the experience of National as a coupler manufacturer. And today, as always, National couplers meet all AAR specifications for gauging and inspection. Close quality control, unmatched testing facilities, nationwide and international service—spell National coupler leadership. Always look for the name National—the name that *means* couplers.

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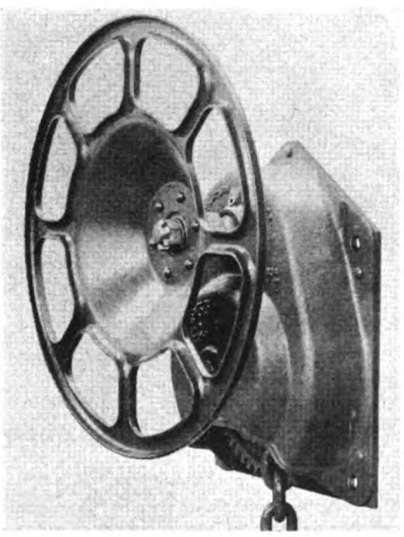
COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES

(*Continued from page 6*)
those used on the Model CF brake. One of the fundamental features of the Budd disc brake is the provision of vertical alignment of the brake shoes with the braking surfaces of the disc to assure uniform brake pressure. This is incorporated in the TFM brake. *Railway division, Budd Company, Dept. RLC, Philadelphia 15.*



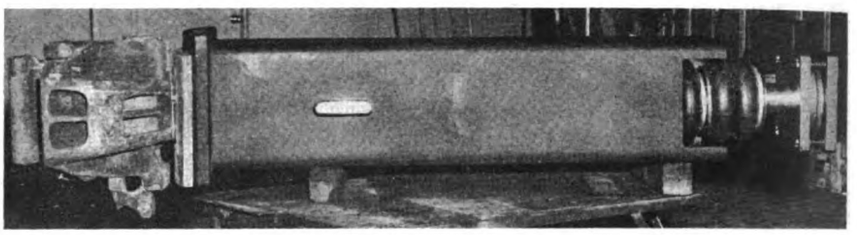
Hand-Brake Wheel

This pressed-steel brake wheel is AAR certified and is now standard on the Equipco non-spin, vertical wheel hand brake. It is available for replacements and is designed to eliminate warpage—to stay true-turning without wobble. Added strength and rigidity resist strain and impact, but damaged wheels can be straightened without weakening the metal structure.

Other advantages claimed are its rim size for most convenient gripping; smooth coined edges that can't snag hands or clothing, and a rugged, forged-steel hub securely riveted to center section. *Equipco Hand Brake Division, Union Asbestos & Rubber Co., 2900 West Vermont st., Blue Island, Ill.*

Hot-Box Extinguisher

The dry chemical Blazer fire extinguisher for hot boxes is a 1-lb moisture-proof container with a perforated metal top which permits rapid flow of dry chemicals after a plastic seal has been removed. The addition of the shaker-type container supplements the pump gun and 4-oz packet previously supplied. *Warren Chemical Manufacturing, Inc., Dept. RLC, 600 Pleasant st., Norwood, Mass.*

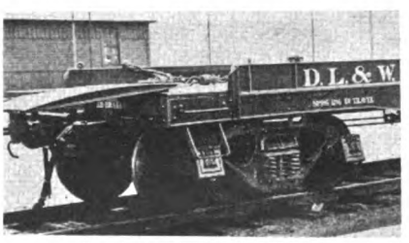


Hydraulic Draft Gear

The Welex hydraulic draft gear is designed to obtain cushioning and control at all stages of impact without recoil. The gear is completely free of air and is hermetically sealed. All operating pressures are confined to a cylinder that is incased in a housing with the cylinder and piston unit completely surrounded by the low-pressure hydraulic fluid. The draft gear is designed to use a standard Type E coupler with 24¾-in. shank. Attached to the coupler is a radius collar that mates with the radius of the striker on the end of the unit housing. All forces in buff are taken at this point. On pull-out, the coupler shank pulls against the key. There is a minimum of clearance (about ¼ in.) between the key and the end of the slot in the shank of the coupler, which is just sufficient to permit a free swivel of the coupler. The coupler and shank are removed by taking out one standard key, with the hydraulic unit remaining in the car center sill.

Since this unit is effective both on pull-out and impact and because it does not have any period of uncontrolled slack, a much longer cushion stroke can be used. An 8-in. stroke has been constructed into the unit. The restoring of the unit is limited to 1 in. before reaching the pull-out limit on the key in the end of the slot of the center sill. This provides a 7 in. cushion in buff when a car is struck while at rest, but still provides a full 8 in. cushion in the run-in or run-out. Any movement of the coupler and shank is under positive control of the fluid in the hydraulic unit. Flow of the fluid on an impact stroke is independent of the flow on the pull-out, permitting the control of pressure or the establishment of any desirable resistance on one stroke without affecting the other. The restoring springs and auxiliary limit springs are not of sufficient tension to have any noticeable effect on the cushioning of the unit. The springs restore the unit to normal position only.

This hydraulic draft gear is adaptable to existing cars as well as new cars. To adapt the unit to existing cars, it is necessary only to clear out the center sill from the bolster filler to the end, remove the present striker plate, install the striker assembly adaptable to the unit, install the back stop and means for securing the unit to the center sill just forward of the bolster center filler and install the spring arrangement that restores the unit to the normal position. *Welex Jet Services, Inc., Dept. RLC, P. O. Box 11336, Fort Worth, Tex.*



Bridge for Piggyback Cars

A rolling type bridge for spanning the opening between cars in piggyback service has a pair of small flanged wheels at rear of bridge running on a track built into the car structure. A second pair of wheels is mounted on a curved cantilever spring at end of car. According to the manufacturer, little effort is required to move the bridge across the opening between the cars.

In running position, the bridge is retracted and lays horizontally on the car to which it is attached, parallel with car deck, and is held in position by a safety latch. This device is said to eliminate safety hazards, inconvenience, and time consumed in use of heavy, hinged type bridge plates which must be locked upright in position for movement over the road. *Brandon Equipment Co., Dept. RLC, 332 South Michigan ave., Chicago 4.*

Insulation Binder

Transulite is a glass-fiber insulation bonded with a thermosetting resin designed to meet the severe moisture problems of the refrigerated transportation industry. The binder, the company says, insures that the total moisture resistance will meet or exceed the indus-

(*Continued on page 76*)

DAVIS

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No. 18
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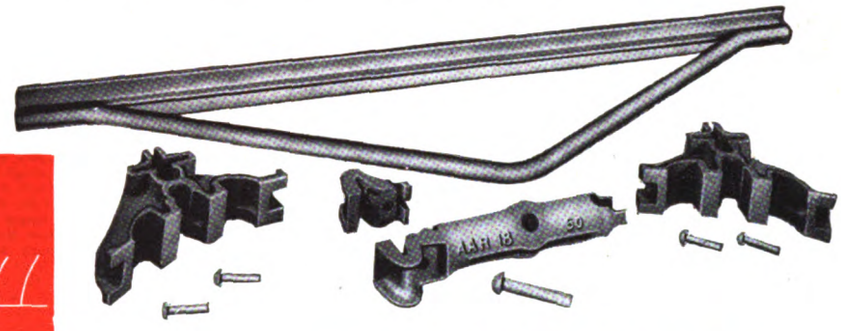
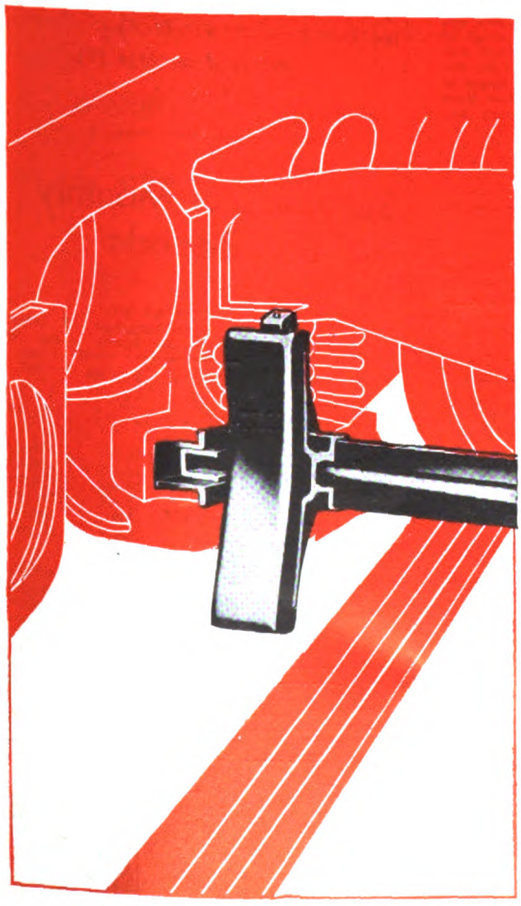
A RECOGNIZED STANDARD FOR MORE THAN 30 YEARS

Whether for Conventional Hanging or for UNIT TRUCKS Davis Solid Truss Brake Beams are DECISIVELY SUPERIOR.





ANY PART RENEWABLE
Without Disturbing the Truss!

OTHER IMPORTANT FEATURES:

- One piece FORGED truss
- No Threaded Rods
- Interchangeable Right and Left Brake Heads Are Easily Applied without Dismantling Truss

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Plant and General Office—Johnstown, Pa.
Boston · Chicago · Cleveland
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Orders and Inquiries for New Equipment

Placed Since the Closing of the October Issue

Diesel-Electric Locomotive Orders

Road and builder	No. of units	Horsepower	Service	Other detail
CANADIAN PACIFIC:				
General Motors Diesel	31	1,200	Road switchers	——
	23	1,750	Road switchers	——
Montreal Locomotive Works	52	1,800	Road switchers	——
	11	660	Yard switchers	——

Freight-Car Orders

Road and builder	No. of cars	Type of car	Cap. tons	Other detail
CHICAGO & EASTERN ILLINOIS:				
Company shops	10	Depressed center flat	125	Cost, $35,000 each.
DENVER & RIO GRANDE WESTERN:				
American Car & Fdry	300	Hopper	70	——
MISSOURI PACIFIC:				
General American	50	Covered hopper	70	Delivery expected fourth quarter 1958.
PACIFIC FRUIT EXPRESS:				
Company shops	500	Mech. refrigerator	—	50-ft. "super giants" for frozen foods.
	500	Mech. refrigerator	—	40-ft for smaller frozen food shipments and for fresh fruit and vegetables. 1,000 cars to be delivered between March 1958 and February 1959.
UNION TANK CAR CO.:				
Company shops	225	Tank	—	For late 1957 or early 1958 delivery.

Inquiries and Notes

LOCOMOTIVES:

Pennsylvania—The Pennsylvania may obtain part or all of a proposed diesel locomotive order through a lease arrangement with the builder. Bids have been asked on 200 locomotives—165 road switchers and 35 yard switchers. Both on a purchase-for-cash and 15-year lease basis. The railroad's action comes in the wake of persistent reports that a leasing arrangement might enter the locomotive financing picture; and it follows a call for quotations by PRR earlier this year on a similar program. In its current call, the Pennsylvania specified that leasing be set up on an initial term of 15 years, with option to the lessee to extend leases of any or all of the engines for 1-year terms, up to a 10-year maximum. Quotations were asked on annual or semi-annual rental over the initial 15-year term and on a daily rental during any extension of the original leases. In addition, Pennsy sought a basis from bidders, as an adjustment of its rent, as to what the bidder will be willing to pay the railroad after return of the locomotives at the end of the lease, amounts which may be reserved by the bidder with regard to sale, lease, use or other disposition of the equipment. Separate quotations were asked for each type of locomotive. The Pennsylvania's call for bids contemplates acquisition of 85 4-motor road switchers, 50 6-motor road switchers, 30 B-unit 4-motor road switchers and 35 yard switchers. Road switchers will be of 1,600- to 1,800-hp; yard engines will be in the 1,000- to 1,200-hp range.

FREIGHT-TRAIN CARS:

Missouri Pacific—Directors authorized expenditure of $13,605,250 for 1958 freight-car program, including (from company carbuilding plant at DeSoto, Mo.) 300 50½-ft DF box, 600 40½-ft 50-ton box, 100 65-ft mill type gondola, 500 52½-ft 70-ton solid-end gondola and 100 52½-ft 70-ton drop end gondola cars; and, from General American, 50 70-ton "Airslide" gondola cars.

PASSENGER EQUIPMENT:

Great Northern—Ordered 15 additional sets of Budd Company disc brakes for installation on 175 cars in "Empire Builder" fleet. GN officials reported to have placed order following studies which showed use of disc brakes would appreciably reduce mantenance costs.

ASME Railroad Division Meets December 4-5

The following program has been prepared for the ASME Railroad Division in conjunction with the annual meeting of the American Society of Mechanical Engineers to be held in New York December 1-6.

HOTEL STATLER

Wednesday, December 4

10 am

Committee meeting.

2:30 pm

Report: Progress in Railroad Mechanical Engineering. Report of Committee RR 6 presented by D. R. Meier, manager railway locomotive engineering, General Electric Co.

Notes on the Starting of Trains, S. Kyropoulos, Holloman Air Development Center.

Advancing Adhesion—Development and Test of a Chemical Formulation to Condition the Running Surface of the Rail for Improved Wheel to Rail Adhesion, F. G. Fisher, mechanical engineer, Reading; R. K. Allen, Locomotive and Car Equipment Department, General Electric Co.; G. W. Luvisi, manager, products development, National Aluminate Corp.

Improving Rail Adhesion for Diesel Locomotives, P. V. Garin, engineer research and mechanical standards, Southern Pacific.

6 pm

Railroad Division Reception.

Thursday, December 5

9:30 am

Mechanical Refrigeration in Railroad Refrigerator Cars, B. E. Duff, superintendent, mechanical refrigeration, Fruit Growers Express Co.

Testing of Railway Passenger Cars and Components, W. W. Seary, chief engineer, Testing Division, Budd Co.

Some Factors Affecting the Riding Comfort of Passenger Cars, W. E. Burdick, engineer of tests, General Steel Castings Corp.

12 Noon

Railroad Division Luncheon. Speaker: Owen Clarke, chairman, Interstate Commerce Commission.

2:30 pm

Should Purchasing Be a Matter of Material and Construction Specification or Functional Specification, J. D. Loftis, marketing director, Products Project.

(*Continued on page 18*)

Summary of Monthly Hot Box Reports

Month	Cars set off between terminals with Hot Boxes: System	Foreign	Miles per car set off
July 1953	9,342	15,775	116,467
July 1954	7,956	10,912	141,946
1955			
July	8,086	13,635	133,813
August	8,555	14,358	128,941
September	5,896	10,469	178,649
October	3,966	7,182	271,364
November	2,010	3,972	493,184
December	1,819	3,774	522,444
1956			
January	2,029	4,302	462,029
February	2,570	5,611	341,542
March	2,517	6,212	346,853
April	3,202	6,881	290,626
May	4,672	10,903	196,688
June	6,777	15,125	135,774
July	8,484	16,067	113,573
August	9,891	16,892	113,474
September	6,834	12,629	149,970
October	4,357	8,429	243,505
November	2,650	5,560	359,759
December	2,256	4,436	438,425
1957			
January	3,373	6,121	291,453
February	3,272	6,844	264,538
March	3,164	6,687	307,306
April	3,949	8,447	228,493
May	6,580	12,691	154,387
June	8,285	16,277	115,749
July	10,438	18,819	96,064

MOTOR WHEEL ANNOUNCES

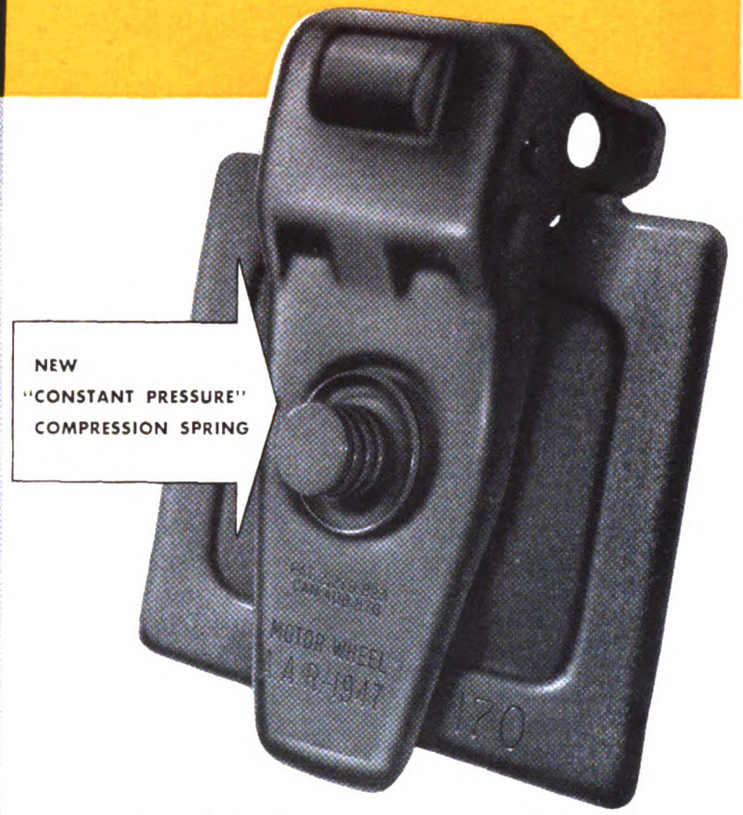
Improved Longer Service
PRESSED STEEL Journal Box Lids

NEW "CONSTANT PRESSURE" COMPRESSION SPRING

- HAS GREATER RANGE OF DEFLECTION
- PROVIDES GREATER SURFACE CONTACT
- INCREASES LID LIFE

Motor Wheel's improved coil spring center construction provides constant pressure over a greater seating surface on the housing. Service tests have proven that this improved assembly increases lid life.

Motor Wheel lids provide 4-way articulation . . . extended housing arms to facilitate raising lid . . . 120° opening for service . . . installation or removal without tools . . . and rugged, pressed steel construction.



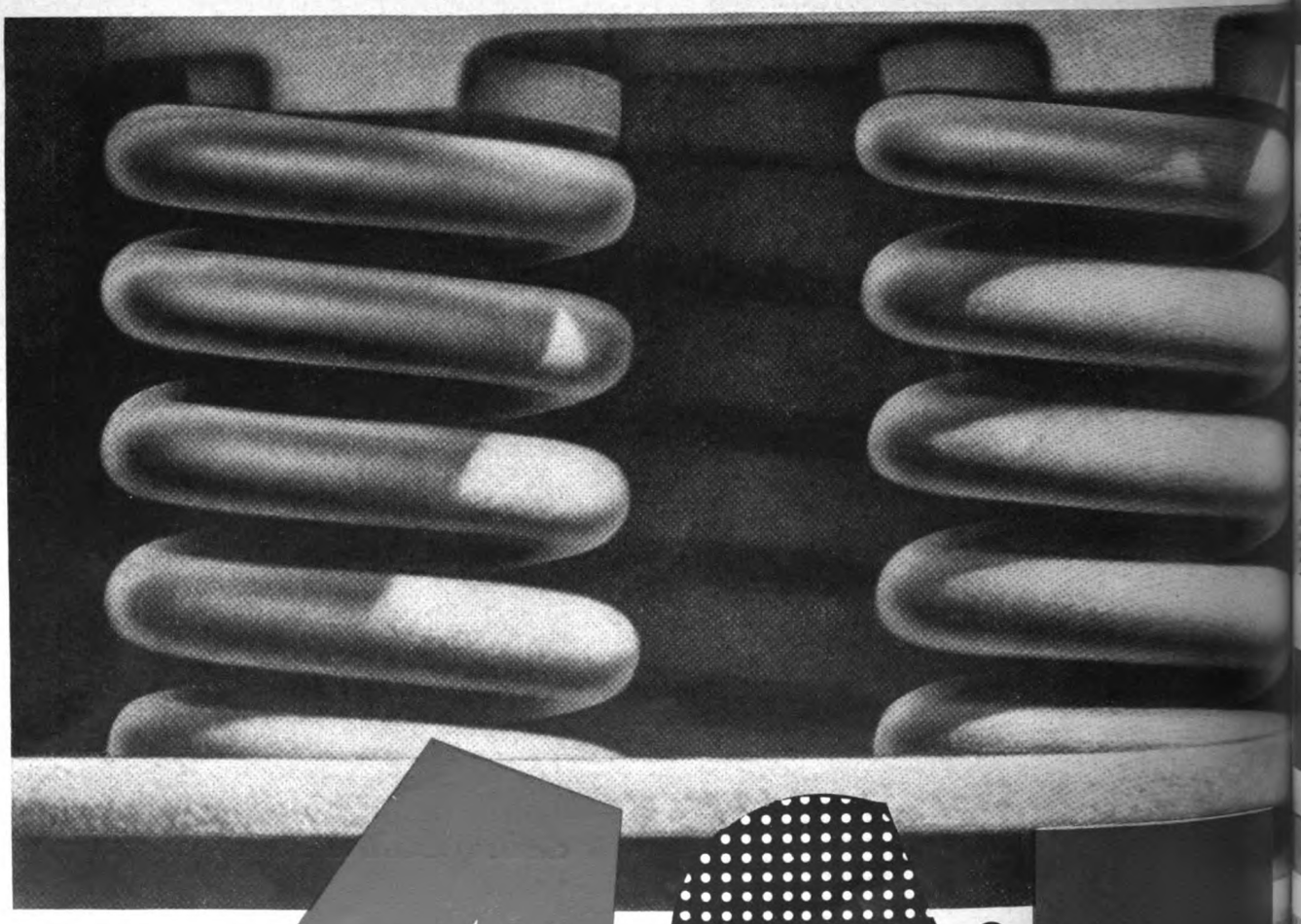
Certified by A.A.R. to latest Spec. M-120-47

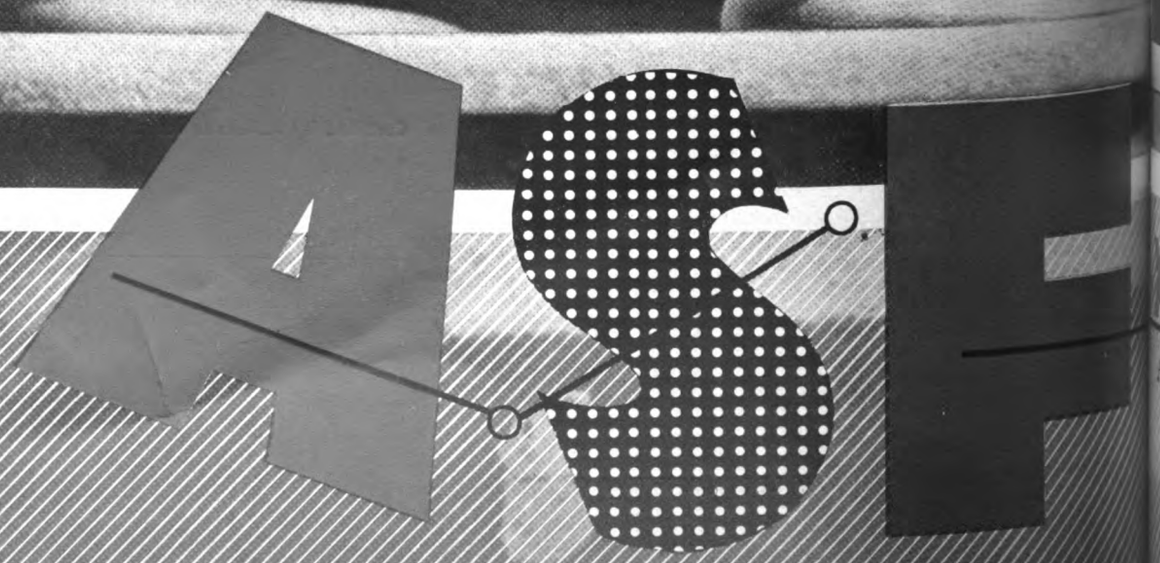
72

MOTOR WHEEL CORPORATION
LANSING 3, MICHIGAN

National Railway Sales Representatives
T-Z RAILWAY EQUIPMENT CO.
G. S. TURNER, *President*
8 South Michigan, Chicago 3, Ill.

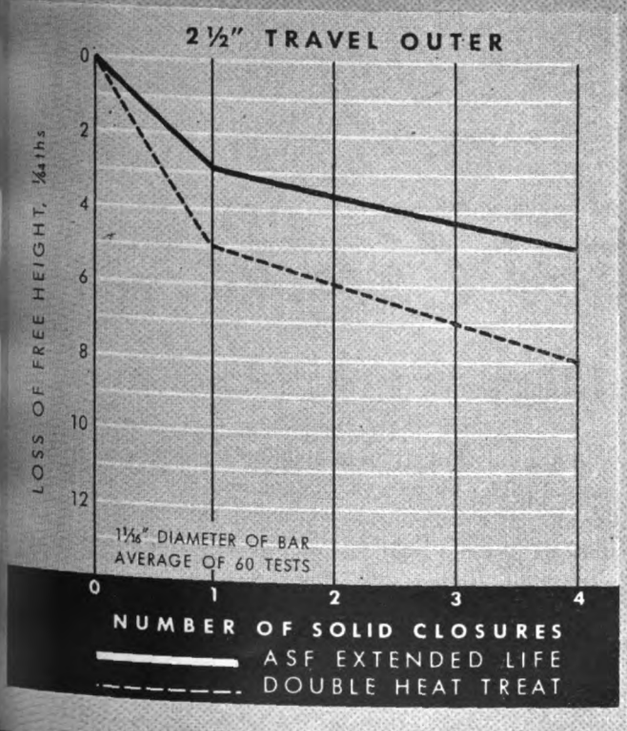
The spring that provides a soft ride





GEARED TO PROGRESS
PRI
MEMBER

...longer!



Here is one of the really significant advantages of ASF Extended Life Springs. As shown by the graph, these springs have almost twice the resistance to permanent set—compared with conventionally heat-treated springs.

In many ways this is a more important advantage of Extended Life Springs than greater resistance to breakage. Any car man can quickly detect a broken spring . . . but the *unseen* cause of many a hard-riding car is the spring that is shirking its share of the load.

ASF Extended Life Springs are available at no increase in price. How much will they save on your road? It depends on your own operating conditions . . . but specifying these modern springs will give you an automatically higher return on your spring investment.

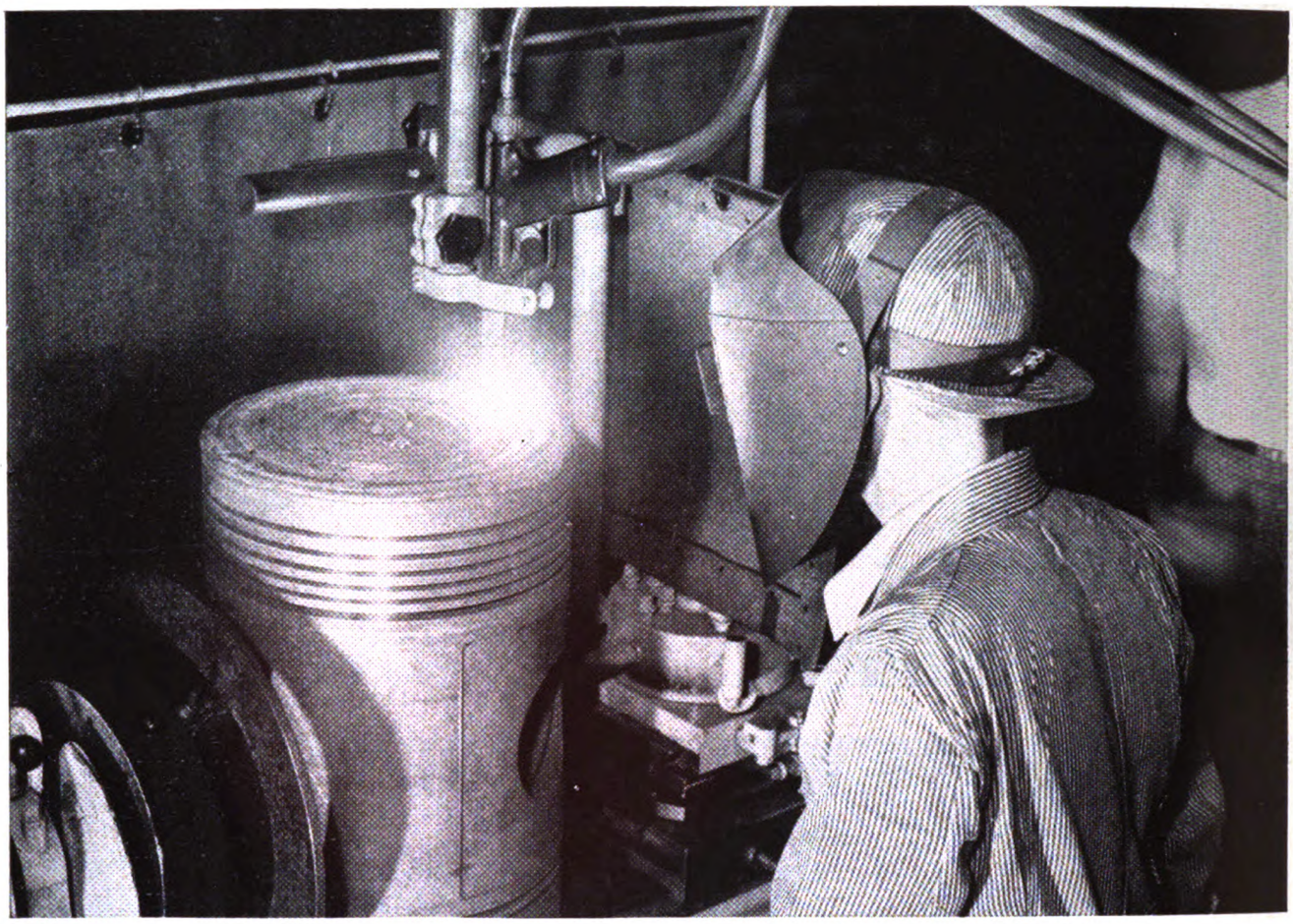
X-T-E-N-D-E-D L-I-F-E SPRINGS

A contribution to railroad progress through research by

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec



Rebuilding piston crowns by sigma welding in a matter of minutes saves approximately 70% of new piston cost.

Rebuilding a Titan's Crown...

By Sigma Welding

Because it delivers increased horsepower faster and more efficiently than a steam boiler, the diesel engine has become a mighty and hard-working titan on the American right of way. But diesel economy and efficiency depend largely on maximum engine compression. Sigma welding is helping railroads maintain this vital compression efficiency by making it routine shop work to build up piston crowns and replace piston carriers—at savings up to 70 per cent of new part cost.

Sigma welding's combination of automatic wire feed and argon gas shielding is simplifying and speeding a wide range of jobs in shops across the nation. The sigma process joins all commercially fabricated metals, and attains speeds of more than 100 inches per minute in many operations. Both manual and automatic mechanized installations are easy to operate and maintain.

Learn how railroads are making greater savings than ever before with LINDE's modern methods for joining metals. Call your local LINDE representative today.

RAILROAD DEPARTMENT

LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

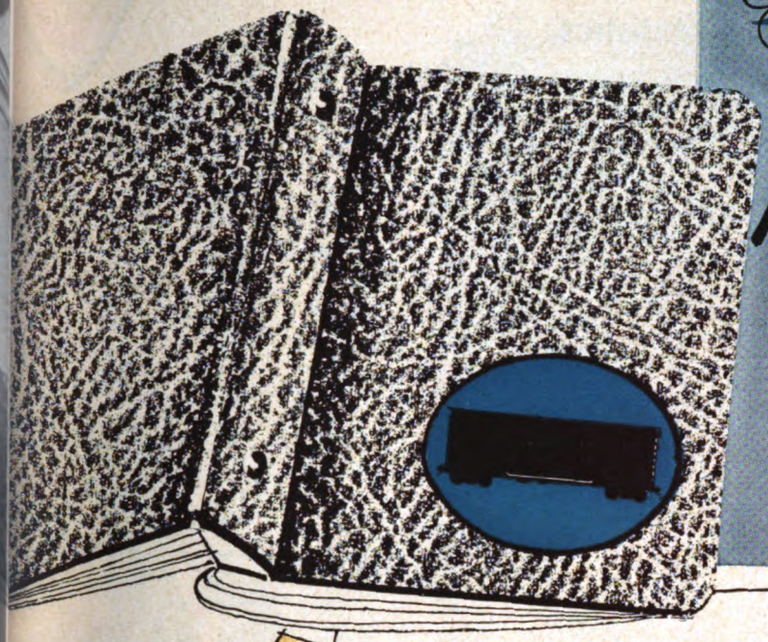
The familiar symbol of over forty years' service to the railroad industry.

30 East 42nd Street, New York 17, New York

In Canada: LINDE COMPANY, Division of Union Carbide Canada Limited, Toronto

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

YOU CAN'T TELL A FREIGHT CAR BY ITS COVER!



Look to the COMPONENT PARTS for its true value . . . because a freight car is no better than its weakest component!

INTERNATIONAL'S ALL-WELDED BOX-CAR SIDES

Delivered ready to assemble, to car owners who assemble their own cars. Maximum welded attachment to the side plate and side sill upper elements.

INDEX

unit load cars
UNDERFRAMES, BULKHEADS, DOORS

box cars
UNDERFRAMES, SIDE ASSEMBLIES, DOORS

bulkhead flatcars

pulpwood cars

piggy back cars
UNDERFRAMES, BULKHEADS

4. gondolas
UNDERFRAMES, SIDE ASSEMBLIES, FLOORS

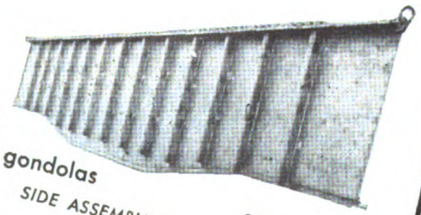
5. hopper cars
UNDERFRAMES, SIDE ASSEMBLIES, HOPPERS

6. refrigerator cars
UNDERFRAMES, SIDE ASSEMBLIES, DOORS

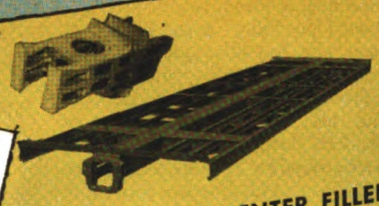
7. cabooses
UNDERFRAMES

INTERNATIONAL'S BULK-LADING SIDE DOOR

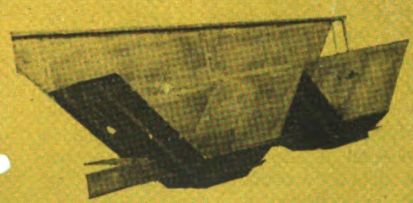
Requires no inside grain door . . . and has an access door for loading, inspection and sampling. Positive retainment on the car structure.



gondolas
SIDE ASSEMBLIES



INTERNATIONAL'S CENTER FILLER, REAR DRAFT LUGS, CENTER PLATE, one steel casting welded integrally into the bolster-center sill connections . . . International's corrective design for an ALL-WELDED UNDERFRAME which has a history of NO FAILURES!



HOPPERS

INTERNATIONAL STEEL COMPANY
RAILWAY DIVISION

PRECISION FABRICATORS OF CORRECTIVELY DESIGNED COMPONENTS

EVANSVILLE 7, INDIANA

(*Continued from page 12*)

American Car & Foundry Division, ACF Industries, Inc.

Design of an 8,500-Hp. Gas-Turbine-Electric Locomotive for High-Speed Freight Service, F. D. Gowans, acting manager, Railway Locomotive Engineering, General Electric Co.

A Proposed Coal-Burning Gas-Turbine Locomotive, D. L. Mordell, dean of engineering, McGill University.

Scored Journals Ruled Off the Rails

Scrapping scored and gouged axles damaged by overheated bearings will be mandatory for all freight cars soon. AAR car-owner members have voted for this requirement along with another making magnetic-particle and ultrasonic testing mandatory for overheated axles even though no surface damage is apparent. Expense will fall on the line handling the car when the hot box occurs.

Miscellaneous Publications

RECOMMENDED PRACTICE FOR REPAIR WELDING AND FABRICATION WELDING OF STEEL CASTINGS.—1957 Manual replaces "Recommended Practice for the Welding of Steel Castings" first issued in 1951. Incorporates the many developments in welding procedure since that date and features comprehensive listing of American Welding Society Classified Mild Steel and Low-Alloy Electrodes. Covers in three sections welding methods, electrodes and recommended welding procedures for carbon-steel and low-alloy castings with each general alloy series indexed for quick reference. Manual a guide for those who use cast-weld technique or who fabricate larger structures using composite-fabrication by means of which steel castings are welded to wrought steel. Serves also as a guide for the repair or field modification of cast and wrought steels. *Steel Founders' Society of America, 606 Terminal Tower Building, Cleveland 13. Cost, 50 cents.*

FLAMMABLE LIQUIDS CODE. 1957 edition of Flammable Liquids Code, NFPA No. 30, supplants former Suggested Ordinance on Flammable Liquids and, in new form, is intended for use not only as a basis of municipal ordinances, but also as the basis of state or provincial regulations. Discusses protection of tanks containing flammable liquids in locations that may be flooded, and the abandonment or removal of underground tanks. *National Fire Protection Association, 60 Batterymarch st., Boston 10. Price, 60 cents.*

Selected Motive Power and Car Performance Statistics

Freight Service (Data from I.C.C. M-211 and M-240)

Item No.		Month of July 1957	Month of July 1956	7 months ended with July 1957	7 months ended with July 1956
3	Road locomotive miles (000) (M-211):				
3—06	Total, Diesel-electric	36,704	35,559	256,708	259,456
3—07	Total, electric	658	682	4,811	5,094
3—04	Total, locomotive-miles	39,338	39,336	278,137	293,495
4	Car miles (000,000) (M-211):				
4—03	Loaded, total	1,545	1,520	11,219	11,678
4—06	Empty, total	974	939	6,655	6,570
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—03	Total in Diesel-electric locomotive trains	106,300	99,700	754,913	743,731
6—04	Total in electric locomotive trains	2,107	2,040	15,203	15,601
6—06	Total in all freight trains	115,127	110,375	822,317	840,338
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.02	1.02	1.03
10—02	Loaded freight car-miles	42.0	41.2	43.1	42.7
10—03	Empty freight car-miles	26.4	25.5	25.5	24.0
10—04	Total freight car-miles (excluding caboose)	68.4	66.7	68.6	66.7
10—05	Gross ton-miles (excluding locomotive and tender)	3,125	2,995	3,156	3,073
10—06	Net ton-miles	1,401	1,310	1,434	1,400
12	Net ton-miles per loaded car-mile (M-211)	33.4	31.8	33.3	32.8
13	Car-mile ratio (M-211):				
13—03	Per cent loaded of total freight car-miles	61.3	61.8	62.8	64.0
14	Averages per train hour (M-211):				
14—01	Train miles	18.6	18.8	18.8	18.7
14—02	Gross ton-miles (excluding locomotive and tender)	57,486	55,693	58,808	56,731
14	Miles per diesel-electric unit day (M-240):				
14—01	Road freight units	202.5	—	209.6	—
14—02	Road passenger units	456.4	—	442.4	—
17	Car-miles per freight car day (M-240):				
17—01	Serviceable freight cars	44.4	43.2	45.8	46.6
17—02	All freight cars	42.4	41.5	44.0	44.8
18	Average net ton-miles per freight car-day (M-240)	870	815	919	940
19	Per cent of home cars of total freight cars on the line (M-240)	110.5	111.1	110.7	112.0

Passenger Service (Data from I.C.C. M-213)

3	Road motive-power miles (000):				
3—06	Diesel-electric	20,343	20,895	136,783	142,481
3—07	Electric	1,134	1,226	8,189	8,843
3—04	Total	21,822	22,830	147,183	156,840
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	227,189	239,896	1,507,586	1,618,167
4—11	Total in Diesel-electric locomotive trains	211,189	219,447	1,392,082	1,467,655
12	Total car-miles per train-mile:	9.90	10.07	9.74	9.89

Yard Service (Data from I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,769,494	3,371,655	26,454,604	26,470,927
1—06	Total	3,915,612	3,567,094	27,604,614	28,363,431
2	Passenger yard switching hours:				
2—03	Diesel-electric[1]	241,087	248,626	1,690,105	1,733,869
2—06	Total	268,651	281,175	1,887,952	1,974,098
3	Hours per yard locomotive-day (averages):				
3—02	Diesel-electric	14.9	13.9	15.4	15.7
3—05	Serviceable	15.1	13.9	15.5	15.7
3—06	All locomotives (serviceable, unserviceable and stored)	14.0	12.7	14.3	14.2
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.76	1.64	1.70	1.68
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.73	0.72	0.77	0.75

[1] Excludes B and trailing A units

Personal Mention

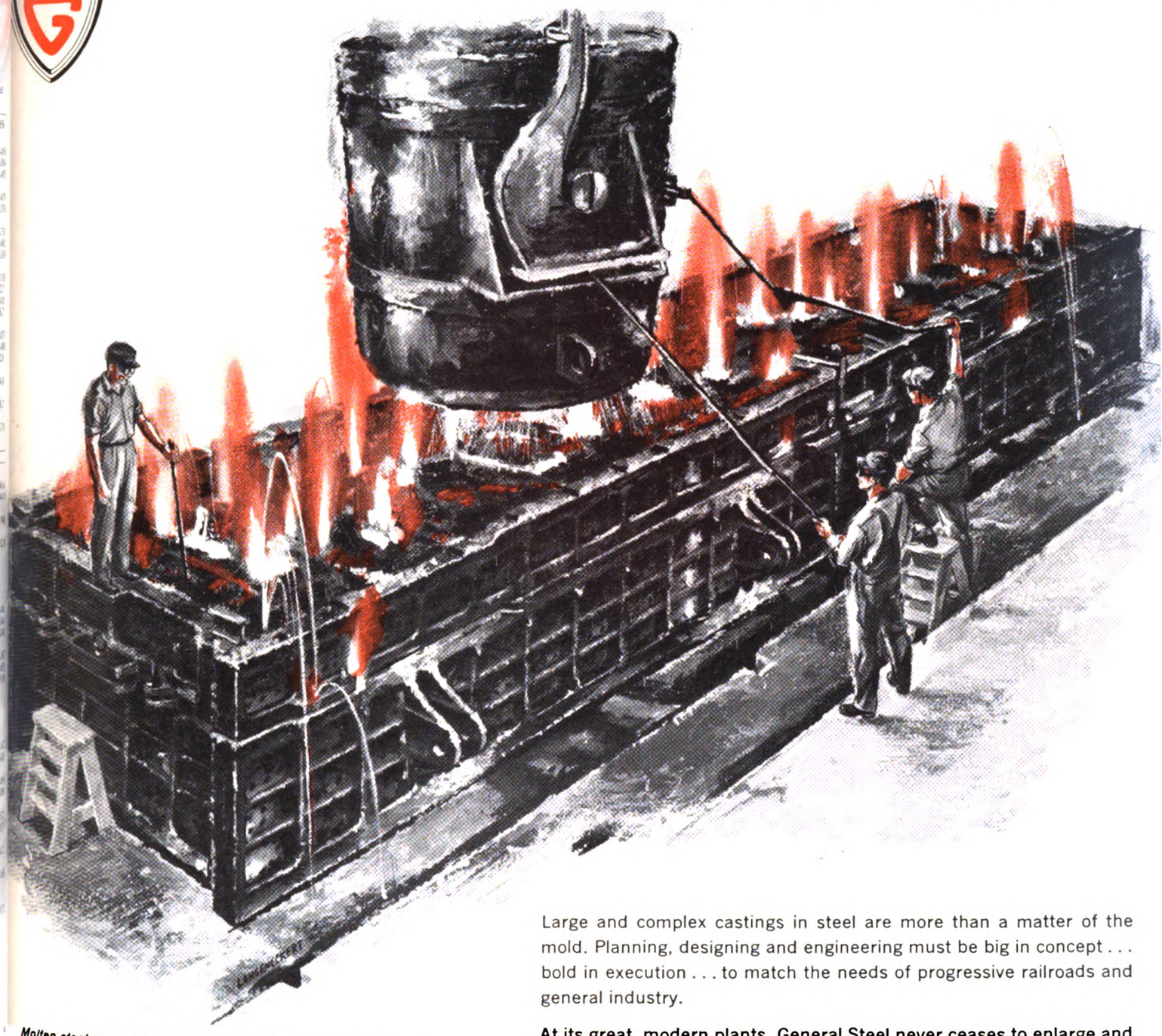
Boston & Maine.—WALWORTH B. WILLIAMS, general foreman, Mechanicville diesel shop, appointed maintenance supervisor at Boston Engine Terminal. ROBERT W. NUTTALL, assistant general foreman at Mechanicville diesel terminal, appointed general foreman. JOHN O. BUYERS, night general foreman, appointed assistant general foreman. THOMAS AIREY, general foreman, Portland-Terminal Company, appointed general foreman at Concord, N. H., car shops. CARL MAGNUSSON, general foreman at Concord Shops, appointed foreman at East Cambridge, Mass., car shops. ARMAND LEMIEUX, foreman of locomotive and car shops at Troy, N. Y., appointed general foreman of car department at Mechanicville. KENNETH W. CHAMBERLAIN, assistant supervisor, air brakes and train conditioning, named air-brake instructor.

Chesapeake & Ohio.—A. B. RAY appointed general car foreman, Parsons, Ohio.

Canadian Pacific.—J. FOWLER, appointed division master mechanic, Portage Division. J. D. Ross succeeds Mr. Fowler as general locomotive foreman at Winnipeg; J. F. BISHOP succeeds Mr. Ross as locomotive foreman at Kenora, Ont.; and F. S. C. TURNER, shop foreman at Brandon, Man., succeeds Mr. Bishop as locomotive foreman at Brendenbury, Sask.

(*Continued on page 20*)

Where railroad progress is cast in steel.....

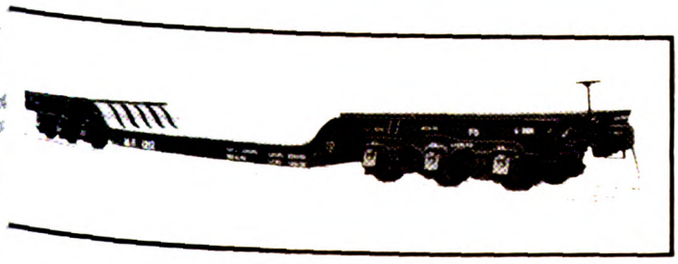


Molten steel cascades from ladle into massive mold to form a Commonwealth one-piece freight car underframe.

Large and complex castings in steel are more than a matter of the mold. Planning, designing and engineering must be big in concept . . . bold in execution . . . to match the needs of progressive railroads and general industry.

At its great, modern plants, General Steel never ceases to enlarge and improve upon the unique experience and skills it has to offer its customers. Commonwealth one-piece cast steel products have become the standard for railroads and other users throughout the world.

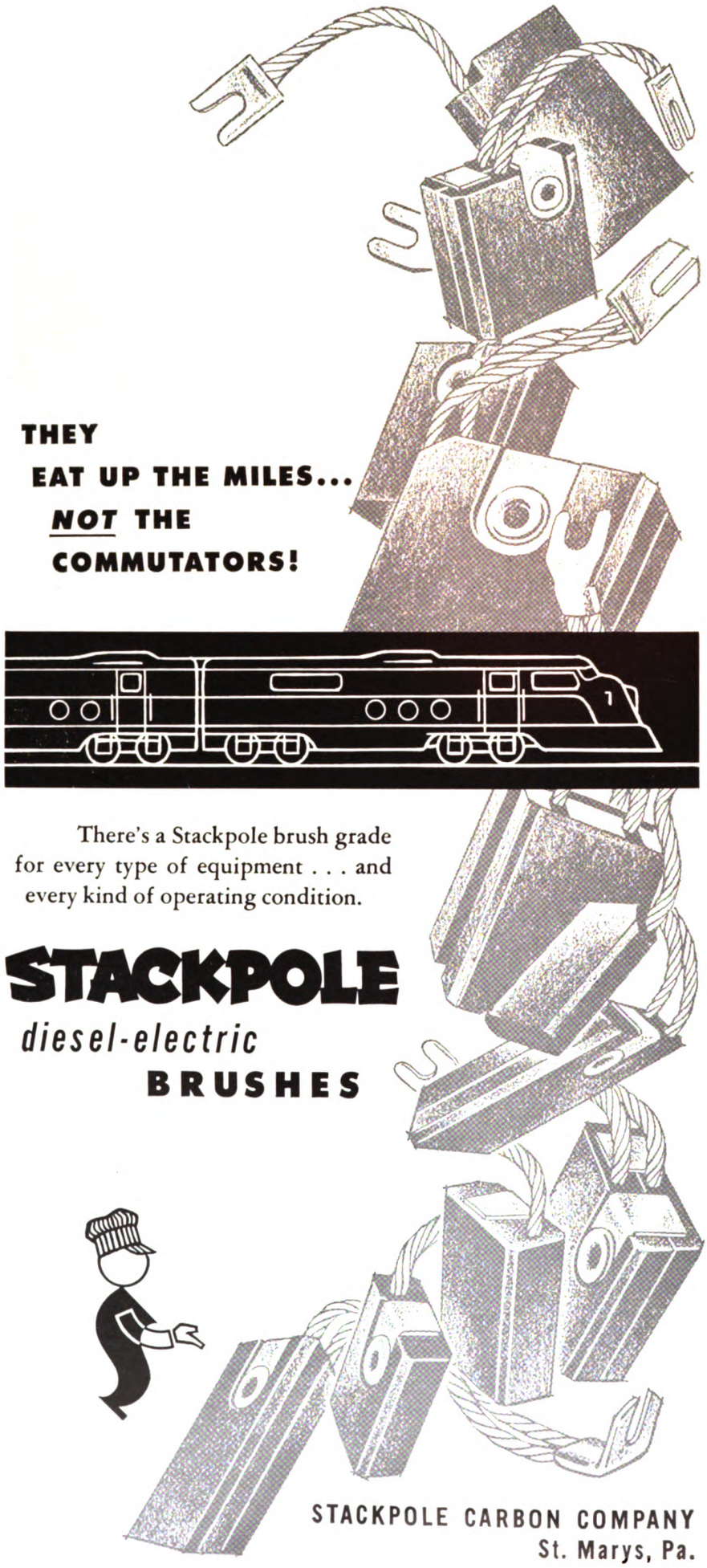
Build with Commonwealth products . . . on your road to lower maintenance costs.



125-ton depressed center flat car. The Commonwealth one-piece underframe provides maximum strength with minimum weight, low platform height for easier loading of higher loads. Completely spring-borne Commonwealth 6-wheel equalized trucks, specially designed for high-capacity freight cars, assure safe, economical operation.

GENERAL STEEL CASTINGS

GRANITE STONE



Personal Mention

(*Continued from page 18*)

Denver & Rio Grande Western.—*Burnham, Denver, Colo.*: R. R. BARBEAU, assistant car foreman, appointed assistant general car foreman. G. L. CRISTOFANO, assistant electrical foreman, appointed electrical foreman, car department.

Elgin, Joliet & Eastern.—DOMENIC J. GENESIO appointed car foreman at Joliet, Ill. CLIFFORD C. BROOKER appointed car foreman at Kirk Yard.

F. L. Hoffman

New York Central.—F. L. Hoffman, who has been appointed general superintendent of diesel-electric shop, Harmon, N. Y., as announced in September, attended Pratt Institute (1930—Industrial Mechanical Engineering). Started with NYC at Avis, Pa., in 1922 as a laborer. Subsequently became machinist helper; machinist apprentice; special apprentice; terminal foreman at Newberry Jct., Pa.; assistant terminal foreman, Avis; terminal foreman, Corning, N. Y.; assistant master mechanic, Buffalo; master mechanic, Buffalo; assistant district manager of equipment, Detroit; industrial engineer, Detroit; master mechanic, Indianapolis, and master mechanic, Harmon.

Norfolk & Western.—A. J. GRAHAM, JR., appointed to new position of assistant enginehouse foreman, Shaffer's Crossing, Roanoke, Va. D. C. FOSTER, foreman of erecting shop at Portsmouth, Ohio, succeeds Mr. Graham as foreman at Iaega, W.Va.

Southern.—JULIUS A. ISAACS, assistant engineer quality control, Hayne Shop, Spartanburg, S. C., appointed general equipment inspector, Washington, D. C. CARROLL H. SHELHORSE appointed assistant diesel superintendent, Washington, D. C. GEORGE I. PARRISH appointed foreman, Danville, Ga. HANSFORD M. COWART, JR., appointed assistant foreman at Atlanta, Ga. W. H. MCMICHAEL appointed assistant foreman, Spencer, N. C.

Obituary

JAMES M. NICHOLSON, 69, retired mechanical and research engineer, Atchison, Topeka & Santa Fe, died August 25 in Topeka.

S. M. VIELE, who retired in 1952 as assistant electrical engineer, Pennsylvania, died September 3 at Blowing Rock, N. C.

The New Vista-Dome Denver Zephyr

A train with many advanced features, Burlington's shiny new Denver Zephyr links Chicago with Denver and Colorado Springs. A popular Zephyr innovation is the Slumbercoach, which offers low-cost room facilities to the coach traveler. Other attractions include the Vista-Dome cars and the authentically western Chuck Wagon car.

Bethlehem wrought-steel wheels and forged-steel axles are part of the standard equipment. This continues a practice of long standing, for the original Burlington Zephyr, back in the Thirties, was also equipped with Bethlehem wheels and axles, as were others that followed.

Today's Bethlehem wheels and axles are the finest ever to come from our shops—more rugged, more durable than ever before. They can be installed with full confidence, for they return a dollar's worth of service for every dollar spent. You are invited to discuss present and future needs with our representatives.

BETHLEHEM STEEL

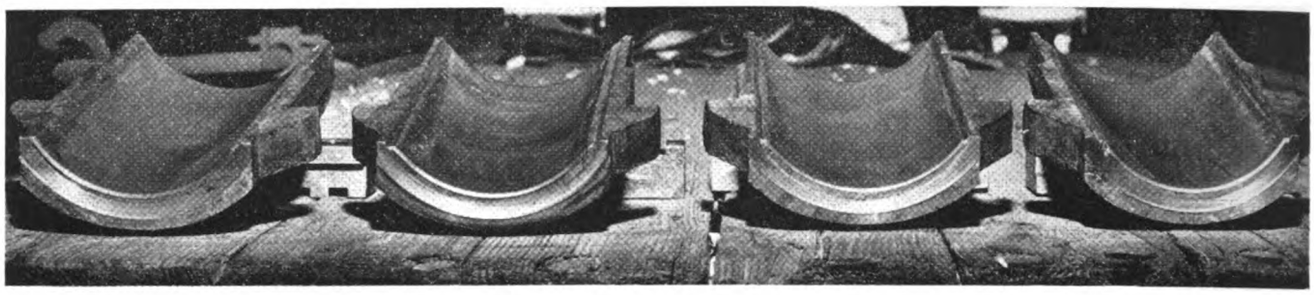
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM WROUGHT-STEEL WHEELS

COMPANIONS TO BETHLEHEM FORGED-STEEL AXLES

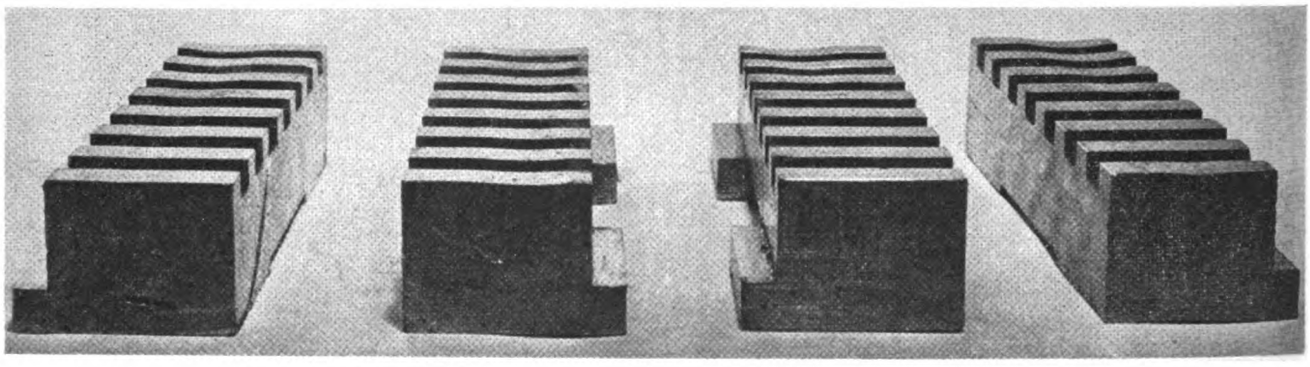
FREIGHT • PASSENGER • DIESEL



MAGNUS SOLID BEARINGS and R-S JOURNAL STOPS

the ideal combination for

YEARS OF LOW COST TROUBLE-FREE SERVICE



Records prove you get the best possible bearing performance for lowest investment and maintenance with R-S Journal Stops and low-cost Solid Bearings

LAST March 20th all bearings on both ends of SL-SF #96082 were removed for inspection after over 5 years of continuous service. This was the original test car equipped with R-S Journal Stops. One end had been equipped with Stops on December, 1951; the other had no Stops . . . but was identical in every other respect.

All four bearings on the Journal Stop end showed only slight end wear and perfect bearing area on the lining surfaces, and were *reapplied* for further service! As of March 21, 1957, these bearings had been in service for *63 months*, with approximately 155,000 miles of travel. All bearings from the end not equipped with Stops showed normal wear after only 11 months and had to be replaced. The Magnus solid journal bearings and R-S Journal Stops from the original test car are shown in the unretouched photos above.

Now, more than 5,000 cars are R-S Journal Stop equipped — in 78,000,000 car miles have averaged better than 6,000,000 miles per hot box from *all causes*.

Bearing-wear records like these are possible because Stops eliminate the major cause of bearing trouble — excessive fore-and-aft movement of the journal within the box. Excessive axle displacement is positively prevented. Bearing, wedge and lubricator stay in place *all the time* — assuring an uninterrupted oil film.

For complete information on R-S Journal Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Coordinated Meetings

Attract 1,700 Railroad Men

Sessions of the four Coordinated Mechanical Associations at the Hotel Sherman, Chicago deal with country's mechanical problems—Hot boxes lead the list; operating phases of diesel locomotives and the question of personnel follow

The 1957 meetings of the Coordinated Mechanical Associations — the Air Brake; the Car Department Officers'; the Railway Fuel and Operating Officers' and the Locomotive Maintenance Officers' together with the exhibits of 136 companies that are members of the Allied Railway Supply Association held the center of the stage at the Hotel Sherman, Chicago from September 15 to 18 inclusive. Those who have followed these meetings were agreeably surprised by the registered attendance of 1,729 railroad members and guests and supply men who were in attendance at the exhibits. The more than 1,700 railroad men who attended these sessions represented about 36 per cent of the 4,868 mechanical men who are paid members of these four associations.

The three-day technical sessions offers the membership 39 technical reports and 20 addresses on a variety of subjects. Abstracts of several of these reports and addresses appear in the following pages. The newly elected officers of the associations are listed on page 32.

Who Is "They"?

(Stuart Schumate, RF&P, before the Car Department Officers')

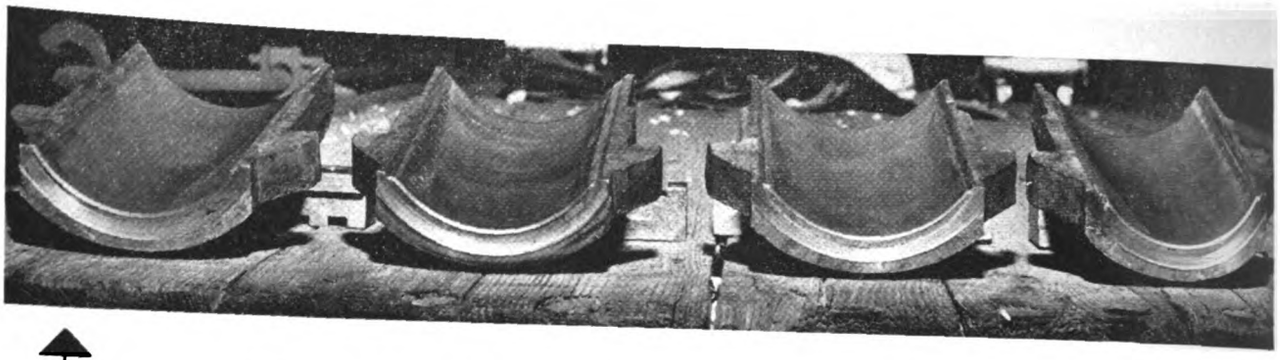
I FREQUENTLY HEAR CAR DEPARTMENT OFFICERS say "they" won't give us time to properly inspect the equipment. I am not sure who "they" is, but let me say to you that who ever he is, there is no time available for him to give. The competitive situation today from the standpoint of time and service does not permit more time, in fact, everything points toward the necessity for reducing the time now allotted for mechanical operations. Let's face it then, what can we do about it? For your consideration, there are five possibilities to improve overall transportation service.

Rearrange Forces

Arrange forces in such way that more men are available on the arrival of trains at the yard to expedite the inspection. You may say that's easy, we can hire enough men to give fast inspection, but the cost would be prohibitive. One way to provide more men for inspection on the round the clock basis is to make car inspectors out of all of your shop forces and instead of working all shop forces on a one trick basis, divide the existing forces for a three trick operation. In this way the shop cars would be expedited and there would be more men available on the night tricks for an expedited inspection when necessary. It seems to me that it is absolutely necessary that we repair cars around the clock. Today's shippers will not accept delays of from 24 to 40 hours for repairing a car which results from a one trick operation of a car repair track.

Repair Minor Defects

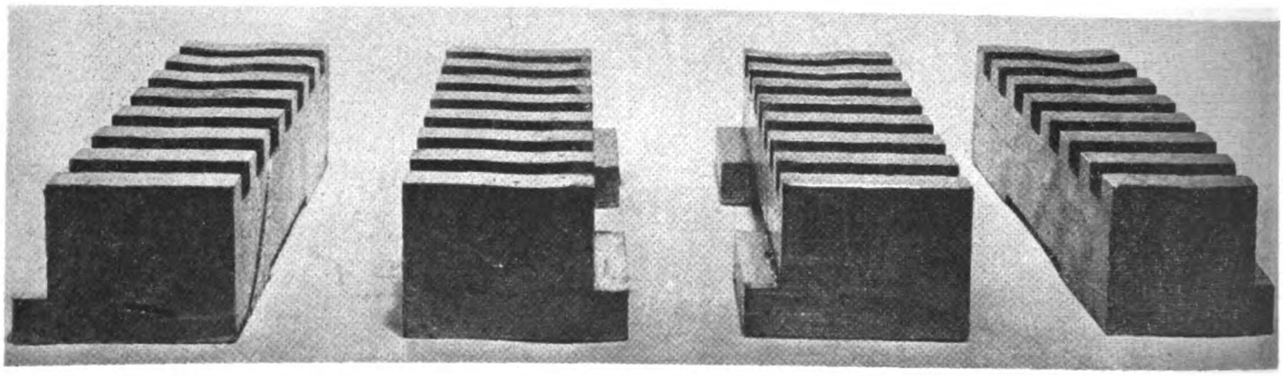
More emphasis could be placed on repairing minor defects while the car is in the train rather than take the delay and the cost of the crew to shift the car out and place it in the shop. On the RF&P we have a motor car with the tools necessary to make minor repairs. This motor car is run along side the train and when the inspectors find a hot journal, for example, the motor car goes to that location and makes the necessary repairs while the inspection of the train is being completed. Oxygen and acetylene are available on the motor car and it is amazing how many repair jobs are being made in the train with the result that the car is expedited through the yard and the expense of the yard crew shifting the car out of the train, handling it to



MAGNUS SOLID BEARINGS and R-S JOURNAL STOPS

the ideal combination for

YEARS OF LOW COST TROUBLE-FREE SERVICE



Records prove you get the best possible bearing performance for lowest investment and maintenance with R-S Journal Stops and low-cost Solid Bearings

LAST March 20th all bearings on both ends of SL-SF #96082 were removed for inspection after over 5 years of continuous service. This was the original test car equipped with R-S Journal Stops. One end had been equipped with Stops on December, 1951; the other had no Stops . . . but was identical in every other respect.

All four bearings on the Journal Stop end showed only slight end wear and perfect bearing area on the lining surfaces, and were *reapplied* for further service! As of March 21, 1957, these bearings had been in service for *63 months*, with approximately 155,000 miles of travel. All bearings from the end not equipped with Stops showed normal wear after only 11 months and had to be replaced. The Magnus solid journal bearings and R-S Journal Stops from the original test car are shown in the unretouched photos above.

Now, more than 5,000 cars are R-S Journal Stop equipped — in 78,000,000 car miles have averaged better than 6,000,000 miles per hot box from *all causes*.

Bearing-wear records like these are possible because Stops eliminate the major cause of bearing trouble — excessive fore-and-aft movement of the journal within the box. Excessive axle displacement is positively prevented. Bearing, wedge and lubricator stay in place *all the time* — assuring an uninterrupted oil film.

For complete information on R-S Journal Stops, write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Coordinated Meetings

Attract 1,700 Railroad Men

Sessions of the four Coordinated Mechanical Associations at the Hotel Sherman, Chicago deal with country's mechanical problems—Hot boxes lead the list; operating phases of diesel locomotives and the question of personnel follow

The 1957 meetings of the Coordinated Mechanical Associations — the Air Brake; the Car Department Officers'; the Railway Fuel and Operating Officers' and the Locomotive Maintenance Officers' together with the exhibits of 136 companies that are members of the Allied Railway Supply Association held the center of the stage at the Hotel Sherman, Chicago from September 15 to 18 inclusive. Those who have followed these meetings were agreeably surprised by the registered attendance of 1,729 railroad members and guests and supply men who were in attendance at the exhibits. The more than 1,700 railroad men who attended these sessions represented about 36 per cent of the 4,868 mechanical men who are paid members of these four associations.

The three-day technical sessions offers the membership 39 technical reports and 20 addresses on a variety of subjects. Abstracts of several of these reports and addresses appear in the following pages. The newly elected officers of the associations are listed on page 32.

Who Is "They"?

(Stuart Schumate, RF&P, before the Car Department Officers')

I FREQUENTLY HEAR CAR DEPARTMENT OFFICERS say "they" won't give us time to properly inspect the equipment. I am not sure who "they" is, but let me say to you that who ever he is, there is no time available for him to give. The competitive situation today from the standpoint of time and service does not permit more time, in fact, everything points toward the necessity for reducing the time now allotted for mechanical operations. Let's face it then, what can we do about it? For your consideration, there are five possibilities to improve overall transportation service.

Rearrange Forces

Arrange forces in such way that more men are available on the arrival of trains at the yard to expedite the inspection. You may say that's easy, we can hire enough men to give fast inspection, but the cost would be prohibitive. One way to provide more men for inspection on the round the clock basis is to make car inspectors out of all of your shop forces and instead of working all shop forces on a one trick basis, divide the existing forces for a three trick operation. In this way the shop cars would be expedited and there would be more men available on the night tricks for an expedited inspection when necessary. It seems to me that it is absolutely necessary that we repair cars around the clock. Today's shippers will not accept delays of from 24 to 40 hours for repairing a car which results from a one trick operation of a car repair track.

Repair Minor Defects

More emphasis could be placed on repairing minor defects while the car is in the train rather than take the delay and the cost of the crew to shift the car out and place it in the shop. On the RF&P we have a motor car with the tools necessary to make minor repairs. This motor car is run along side the train and when the inspectors find a hot journal, for example, the motor car goes to that location and makes the necessary repairs while the inspection of the train is being completed. Oxygen and acetylene are available on the motor car and it is amazing how many repair jobs are being made in the train with the result that the car is expedited through the yard and the expense of the yard crew shifting the car out of the train, handling it to

and from the shop and placing it in outbound train, is saved. This motor car is also used to expedite the air brake inspection for outbound trains.

The third item which seems to me should receive more wide spread use is the pit inspection of trains as they enter the yard. With the use of present day hot box detector and a well lighted pit, with an inspector on each side of the train the inspection overall time could be materially reduced. There are many objections each of you can cite for such an inspection. Each time I see a car inspector at night with a little hand light attempting to inspect a car in the rain or snow walking along the side of the train, I am impressed with how much more this man could see if he were located with relation to the car with good lighting and necessary equipment to observe the train as it passed over a pit at the yard entrance. Maybe a compromise between the pit and walking inspection is the answer, but this is an area to which you might well devote some real study.

"If they'd give me the money . . ."

The oft-heard remark among car department officers is: "I could shop 9 out of 10 cars in that train if I wanted to." Now if this is the situation it is time something was done about it. Your first reaction probably is "If they gave me the money I could fix it." Here again we have that mythical vagueness and here again our friend "they" has no more money to use than he had time in the first item mentioned. So the problem is back in your laps. It seems to me the problem should be faced realistically; if we are expecting car inspectors to run certain cars, let's correct this situation. Practice preventive maintenance and place the responsibility where it belongs. By leaving such matters to the judgment of the car inspector who varies so greatly in ability and judgment, we are not being realistic. I have often thought it would be advisable to have a car inspector foreman who had the necessary ability and authority pass on each car that is shopped. You could then insist on uniformity of shopping and such things as permitting a load to go to destination if it were safe and make the necessary repairs after unloading Other than for penalty defects and unsafe conditions, no loaded car should be shopped. Repairs to the greatest extent possible must be made to the empty cars to prevent delay to the shipments of our customers. With a uniform inspection we could get away from the tendency that now exists to shop sufficient cars to keep the existing shop forces busy.

Too Much Lost Motion

There is still too much lost motion in all departments on railroads today. A good architect when designing a house thinks through carefully all the activities that will go on in that house and then suits his drawing to those activities. Are you good architects? Is there any waste motion in your shop?

The labor costs of American railroads today is 47.9 per cent of the gross income and yet we say that a large per cent of the cars now being run should be shopped for attention. You should closely analyze the work of your shop in every detail toward the end that labor now wasted on unnecessary moves can be utilized toward putting these cars in the shape you would like to have them.

Let's face the fact that even if railroads are fortunate enough to get favorable legislation, it will still far from solve our total problem. We must accept the fact that "they" do not have all the time you want for inspection and "they" do not have all the money you want for repairing cars. Sure, we have problems, but we also have advantages. Let's capitalize on them and promise ourselves and our railroad that we are going to use our own God-given ingenuity to make the best of what we have to produce the kind of service the public demands.

Manpower is the Real Problem . . . . . .

J. T. Daley, Alton & Southern, before the LMOA

The lack of interest shown by college graduates in the railroad industry is perhaps understandable because of several factors that may be involved. There are the long hours. We are called upon to work different shifts, seven days a week. There is strong likelihood of living in different communities, compelling us to change family location and friends.

Registration at Coordinated Mechanical Meetings

Association	1957	1956	1955	1953	1952	1951
Air Brake	161	275	169	192	135	280
Car Department Officers'	398	353	433	520	523	563
Locomotive Maintenance Officers'	694	652	717	950	840	1,017
Master Boiler Makers'	—	—	—	172	127	215
Railway Fuel and Operating Officers'	338	289	267	322	433	268
Electrical Section, AAR	—	—	—	—	205	155
Railroad Total	1,591	1,569	1,586	2,156*	2,263	2,498
Railroad Guests	138	20	110	—	361	—
Allied Railway Supply	1,578	843	1,522	869	1,003	1,152
Railway Electric Supply Manufacturers'	—	—	—	—**	305	168
Grand Total	3,307	2,432	3,218	3,025	3,932	3,818

* Electrical Section met at Atlantic City

** Atlantic City Convention in June—No exhibit at Chicago in September

NOTE: No Chicago meeting in 1954

Any man who meets these tests has a lot to be said for his loyalty to his company and his job.

For instance, the man who applies for employment first makes out an application form. He puts in writing his own qualifications and indicates to us his desire to be a part of the railroad industry. Then if accepted—and while he is gaining experience—we have the opportunity to watch his growth; his attitudes not only toward management but also to people he is associated with, how he reacts to criticism; his ability to create new ideas; and finally his ability to be his own critic.

What better place, then, is there to get our future leadership than among people who have indicated a strong desire to make railroading a life work?

Isn't it possible that we have overlooked a number of people who have great potentials? Why not give *them* the opportunity to obtain higher education? The way surely can be found to accomplish this. All we as an industry need is the determination to do this.

Isn't it true that we have a far better chance of keeping this employee after he has advanced himself in this way than we do with certain college graduates? Many of you have had the experience of hiring such men and then having them leave after they have acquired certain experiences and been called upon to take an assignment they may not particularly like, knowing they can readily gain employment in some outside industry?

Securing young, well-educated and ambitious men is not the only problem the mechanical departments are faced with—sometimes the larger problem is keeping good men after we get them. For years the people who have addressed these meetings have portrayed the value of a stabilized labor and supervisory force and have recommended more careful planning to wipe out the peaks and the valleys of the employment curve. But, if railway management can't find a way to prevent experienced personnel from migrating from the railroad field to other industries every time there is a shut-down due to a drop in business the end result, over a period of time, will be a gradual deterioration in the quality of personnel and a consequent increase in maintenance costs. This problem of manpower, especially for the future, overshadows almost every other problem in importance. Yet, little progress seems to have been made.

Co-operative Approach to Safety . . .

R. M. MacDonald
(Director of Operation,
Board of Transport Commissioners for Canada)
before the LMOA

To say that the inauguration by railway management of safety meetings with employee groups was at first attended by an evident lack of enthusiasm is to put the case mildly. Happily, however, these get-togethers are now the order of the day on all railways in Canada and they are providing an effective medium of safety education mainly because of this direct and first-hand approach to the working habits of the individual employee.

It seems timely, indeed, that such a practice took root during the period when accepted and long-established railway patterns began to take on a new concept. It is significant that the inauguration of the informal conferences by our Branch of the Board in Canada also took place around the same period.

Let us look at how these conferences developed and what they have accomplished. One of the obligations of the Board of Transport Commissioners' Operating Branch is to investigate accidents involving collisions between trains and motor vehicles at public crossings with a view to providing greater safety. In this connection the Railway Act deals specifically with the question of warning devices and their use by train crews approaching public crossings. Because of the relatively large number of unprotected crossings in Canada this is recognized to be one of the important factors in the Board's investigation of such accidents.

Following the introduction of the diesel electric unit in Canadian main line service, attention was soon focused on the incidence of a series of crossing accidents in which the driver of the highway vehicle failed to associate the sound of the warning signal with that of an approaching train. The Board's investigation clearly established that this was a contributory factor in causing the accident. It was evident that the situation demanded prompt remedial action.

With the object of reviewing all aspects of the situation, a conference was called by the Board's Operating Department. This conference was attended by representatives of the Railways, the Railway Supply Industry, representatives of the National Legislative Committee of the Railway Transportation Brotherhoods, together with skilled technicians in the field of sound from the National Research Council.

The conference culminated in substantial agreement being reached to the effect that an effort should be made to produce an air whistle which would more faithfully simulate the sound of the conventional steam whistle with which the public had become so familiar over the years. Following a recommendation made to the Board, in this connection, General Order No. 753 issued directing the railways, within a stipulated period, to equip diesel electric motive power units operated regularly in road service, with horns having tonal characteristics simulating the sound of the conventional steam locomotive whistles.

In due course experiments were conducted with substantially the same representation in attendance. Individual types of horns were finally approved on the basis of actual field listening tests and it is to the credit of the Railways and the Railway Supply Industry that suitable horns were manufactured and installed within the prescribed period. The real significance of this development, however, lies in the fact that the ratio of public crossing accidents associated with a misunderstanding of the warning signal diminished very perceptibly following this modification of the warning device.

All this was accomplished in a relatively short period of time and undoubtedly the conference approach to the problem providing as it did an opportunity of frank and candid discussion on all aspects of the situation was directly responsible for the production of what we consider to be a sensible and realistic regulation.

This Order has not been cited because it represents an outstanding example of the results of roundtable discussions on matters involving the railways and the Board. This is but one of several of the benefits which

have issued from these informal discussions between management, labor, and representatives of the regulatory body.

Within the past year conferences have taken place with respect to the proposed adoption of uniform air brake regulations. As a result of these negotiations it is anticipated that a Uniform Code of Air Brake Rules, acceptable to the Board, will be introduced on Canadian Railways shortly.

In some instances, this informal approach to safety objectives has involved a committee comprised of representatives of the Railways, Railway Employees and the Board contacting manufacturers and suggesting improved safety factors in the design and structure of certain components of railway equipment.

As a case in point, I might mention the strengthening of the nose door on diesel electric A-units designed to provide greater protection for the occupants of the cab in the event of a collision at a public crossing. This action, which was instituted in Canada in 1954, was timely indeed. Although we had remained comparatively free of such accidents in Canada up to the end of 1955, the past year has witnessed 10 serious collisions at public crossings involving highway vehicles carrying gasoline and other dangerous commodities. It is gratifying to find from the investigation of these accidents that where diesel A-units were involved, the strengthening of the nose door did play a significant part in providing some additional protection to the employees in the cab.

This was accomplished without the necessity of any formal action on the part of the Board.

'Spot' Car Repairs Gaining Popularity

Close coordination between mechanical and transportation departments was urged by the recent CDOA report of the committee on light repair tracks and train yard operation. Coordination should be achieved, the report continued, to have shop cars promptly placed on repair tracks and repairs made promptly to release cars for continued movement.

Modern tools, mechanized materials handling and location of material storage areas were all cited as points to be explored for expediting car repairs. The group placed major emphasis on around-the-clock operations or repair facilities, sheltered operations, and the "spot" repair system.

"The spot or progressive system of freight car repairs greatly increases the output of the car repair force. The saving is even greater if work is done inside a modern, well-lighted car shop with overhead traveling cranes; or under cover protecting the car men from the elements."

Overhead cranes can do much to speed light repairs, and if they are impractical, air jacks, lift trucks and small mobile cranes are used to good advantage. The committee urged that fully assembled trucks be kept on hand for system cars, rather than to hold the car for installation of individual wheel sets.

Southern's Method

During discussion, C. Kimball, chief car inspector, Southern, described his railroad's new repair facility at Birmingham, Ala., Birmingham is a complete "spot" system with all work performed in a 20-ft space on the repair tracks. Materials are kept on skids for ready movement to these repair operations. The repair area is under cover and there is no necessity for car men to leave the work area.

There are no specialists in the Southern's Birmingham operation, according to Mr. Kimball. Two-man crews do the variety of operations involved in light repairs, including air brake cleaning, repacking, new wheels, and welding. Two men change wheels in 30 min. Switching locomotives only move cars to and from the repair facility with all movements there being completely mechanized. Even the blue flagging is an automatic operation.

At the repair apron are three hydraulic jacks along the track for handling cars. There are jacks along both rails, and a third jack between them. Air, gas and water are supplied through reel-mounted hoses at this point. Repair materials and operations are reported vocally by the repairing carman on a tape recorder for subsequent use in billing.

The operation is an around-the-clock one and the new methods have been working out well, according to Mr. Kimball. The Birmingham facility is now turning out 70 to 100 cars per day. It is the practice to make no repairs in the transportation yard at Birmingham because the Southern has found that it can switch cars out faster than it can get necessary tools and men to the bad order equipment.

CDOA's "Hottest" Topic . . . . .

Pads, Seals and Stops Cut Hot Box Rate

New lubricating devices and improvements in other journal box components were the topics of the CDOA car lubrication committee's report, and an ensuing spirited discussion. The committee states, "Waste has been thoroughly discussed in the past and we do not think that we can add any further comments to this subject."

The report indicated that one major railroad's study indicated a present-day cost of $140.00 per hot box.

(*Continued on page 30*)

Eight Ways to Abuse a Diesel Locomotive . . . . .

. . . . . and how to prevent them

Excerpts from a talk by F. B. Rykoskey (B&O) before the Fuel Association

1. Danger From Running Gear Trouble

There is no other single item I can think of that could result in a more disastrous accident than conditions arising with the wheels and traction motors on diesel locomotives. Engine crews should be impressed with the serious danger of a seized armature bearing, which results in a locked wheel. A repeated wheel slip indication or a repeated ground relay operation should indicate that trouble may be developing in one of the traction motors which could result in a sliding wheel.

Several derailments have been caused by seized armature bearings, resulting in locked wheels and false flanges. In one accident, over 100 persons were injured as a result of a locked wheel sliding for a distance of forty-seven miles. The train had been stopped several times by operators reporting fire flying from under the locomotive, yet the engine crew, either through negligence or lack of education, failed to realize that one of the wheels had locked and was sliding. It should be pointed out to engine crews that when the power plant is isolated or the traction motor cut out, the wheel slip indicator no longer operates, and extra precautions should be taken to make sure that all wheels are rotating. When in doubt, the train should be stopped and a member of the engine crew should stand on the ground and observe all wheels, to see that they are turning.

2. Failure to Understand the Engine

The most expensive piece of equipment on a locomotive is the diesel engine itself. It is equipped with safety devices such as over-speed trip, low lube oil pressure switch, hot engine alarm, etc. to prevent damage where trouble has developed. Crews should not attempt to restart an engine that has been shut down to low lubricating oil pressure, hot engine alarm, or other reasons, until the reason why the alarm operated has been determined. A good rule of thumb to follow is: if an engine will not start in 10 seconds, then something is wrong and further attempts should not be made to start it.

3. Improper Throttle Handling

Real damage can result to the electrical and mechanical equipment on a locomotive and the train itself if the throttle is not properly handled by the engineer. In steam locomotive days it was the common practice to pump the throttle when starting a train. On a diesel locomotive this results in opening and closing the power contactors under heavy load, which results in arcing and damage to these electrical components.

Before starting a train the engineer should familiarize himself with the train consist. He should know where the loads and empties are located and if it is necessary to take slack before starting. Attempting to start before brakes are properly released or slipping excessively from bad rail conditions is responsible for electrical damage to the traction motors and main generator. Excessive slipping often results in flashing of the motors and main generator. Crews should realize that if they do not understand the operation of the power contactors, interlocks and relays, they should not attempt to operate them by using flag stick. The load meter in the cab is used to indicate to the engineer the current measured in amperes flowing to the traction motors. The safe load range is usually clearly indicated on the instrument panel. No attempt should be made to operate the locomotive in the over-load range beyond the allowable time limit.

Definite instructions have been issued concerning the notching down of the throttle on crossovers. Yet, we still have damage caused by excess power being used on crossovers. These instructions should also include known track conditions, such as drawbridges that are rough enough to jar the brushes in the traction motors.

4. Improper Brake Valve Handling

Many units today are equipped with the dynamic brake. The crews should understand that flat spots on the wheels of the locomotive can result by using the independent brake valve when the dynamic brake is in operation. We all know too well what can happen in a long train by run-ins and run-outs due to improper brake operation. In using the dynamic brake the engineer should know the consist of the locomotive units and measure the safe dynamic brake load by the weakest unit in the group.

5. Improper Sander Valve Handling

We often call sand a necessary evil. While it aids in starting a train, by increasing the adhesion between the wheels and the rails, it causes untold damage to the electrical and mechanical equipement on the locomotive. In an attempt to correct the use of excessive sand we have installed front wheel sanders on the Baltimore and Ohio. This allows the engineer to use sand only under the leading wheels of the locomotive. It has not only saved sand but has also reduced locomotive maintenance. Elaborate lube oil and air filters were installed on locomotives but like any other piece of equipment they are not 100% efficient. Therefore, the less sand used the better chance we have of preventing it from entering traction motors and diesel engines. All doors should be closed at all times to permit the car body filters to function properly.

Most engine crews realize the damage to ring gears, motors and pinions from using sand under a slipping wheel. Never permit an engineer to drop sand under a slipping wheel.

6. Failure to File Information

No one is in a better position to detect mal-functioning of the equipment than the engine crew. They are with the locomotive when it is operating under full load at various speeds and they should be constantly on the alert and report intelligently to the shop forces any unusual conditions that existed on their run. Shop forces are not always in a position to make a thorough inspection of equipment under load. There have been many cases where definite indications existed and the crews, either through ignorance or neglect, did not make a proper report.

7. Excessive Speed of Operation

We are continually experiencing traction motor trouble due to excessive speed. Crews should be impressed with the fact that the gear ratio is very important in the limits that are imposed on the operating speed. A locomotive with 62:15 gear ratio should not be operated in excess of 67 mph. At this speed the traction motors are revolving at from 2,200 to 2,400 rpm. This traction motor armature speed will not be reached on a passenger locomotive until the speed is approximately 108 mph. Traction motor armature speeds are much higher on a freight locomotive than a passenger locomotive. Excessive armature speed will cause raised commutator bars, broken string and wire bands and gear damage to the traction motors.

8. Improper Care of Locomotive Cabs

One item of expense is the replacement of wind shields, caused by men placing their feet against them, resulting in scratches and general marring of the surface of the glass. This finally results in obstruction of vision and causes a safety hazard. Other damages in the cab include fire extinguishers, water coolers, speed recorders and braking equipment, usually caused by men resting their feet upon this equipment. Another major item of expense is the repairs to cab upholstering, including the seats, arm rests and back rests. Sharp objects should not be carried in pockets that tear the seat upholstery.

Pads, Seals and Stops

(*Continued from page 28*)

The committee went on to report, "We cannot assume that these lubricating devices are going to be a cure-all. There are so many factors involved in causing hot boxes other than lubrication."

Shortcomings of existing lubricating devices reported include collapsing cores, breakdown of pad suspension springs, disintegrating of the pads from improper sewing, and a tendency to rotate around the journal. This rotation has been prevented in some cases with waste retainers but it had been found that the pressure of the retainer tends to restrict the flow of oil. "This particularly applies," the committee reported, "to pads where the oil feed is around the pad."

One railroad with 20 years experience with pad lubrication for steam locomotive and passenger car journals reports that hot box coolants do not work well with pads and advises that the overheated pad be removed and replaced with waste before the coolant is applied and further movement is attempted. "Waste," the committee concluded, "will still have its place on the railroad, replacing the pad when a hot box occurs.

Better Seal Needed

Increase in ambient temperature and decrease in lubricating oil's viscosity and load-carrying ability during summer months may cause small journal and bearing defects developed during previous cold months to operate so that hot boxes develop. Some railroads are using a premium grade of car oil made from greatly improved base stock with extreme-pressure and oiliness additives which increase the thickness of the oil film and its load-carrying ability. The committee reported, "Such an oil assists in keeping the running temperature of car journal bearings having small defects to as near normal as possible.

"The present AAR dust guard seal is totally inadequate in attempting to perform the function it was designed for," stated the committee. They went on to report increased oil consumption with pad-lubricated cars, and said that this was an acute situation on car dumpers. In deserts, the life of lubricator pads is greatly reduced without adequate front and rear seals. The fine dust will make the ad inoperative, or it will be filtered out of the oil in the wicking medium—eventually clogging this and leading to failure.

Journal Stops Endorsed

Return to the pre-war journal bearing, ¼ in. longer, will cause the excessive lateral in older trucks to be "somewhat corrected", but axle stops will be necessary to control the "fore and aft" movement of the axle in the journal box. In addition to being necessary for proper operation of the rear seal, the committee states that "longer journal bearing life will be obtained because axle stops will prevent the pounding out of the lining metal and also retain lubricating pads in their proper position directly under the journal.

Detection of hot boxes on long trains is becoming more difficult. The adoption of an odor additive in the journal oil or a modification of the present passenger car odor bomb for freight service were urged as worthy of consideration.

William M. Keller, AAR, stated that earlier reports by the Norfolk & Western indicating three time better performance with pad-lubricated cars was confirmed by two other railroads. W. Faris, N&W, reported that the pad-equipped cars on his railroad had operated nine times farther per hot box than waste-packed cars during August. A. J. Schulte, Santa Fe lubrication supervisor, said his road is equipping 1,500 cars monthly with lubricators and now has 16,000 done. He warned that railroads should not plan on an extension of the January 1, 1960, date for mandatory use of lubricating devices in interchange. The Santa Fe operating experiences are comparable to those of the Norfolk & Western. Mr. Schulte paid respects to both railroads and suppliers who, he said, are doing a good job with lubricating devices.

Wedge Is Problem

Mr. Schulte also called for more attention for the wedge and said that the AT&SF has found that the 50-in. wedge may be some better than the standard 78-in. radius wedge. Both he and another CDOA member from the Santa Fe stated that journal stops are a big factor in journal performance. Stops are essential for a successful rear oil seal, according to Mr. Schulte and "Savings in bearings alone will pay for the stops".

A Leask, Southern Pacific, cited his railroad's experience in finding 121 misapplications of controlled-clearance bearings in a two-month period. He said that his road, instead of using the "A", "B" and "C" designations for identifying bearings, is using the final numbers of "2", "7" and "9", from the sizes stamped on the bearings. These are the same for the four bearing sizes and correspond to the letter designation.

Hot Box Experiments

W. A. Mullen, B&O, told of his railroad's experimental work in finding the causes for hot boxes. The B&O has been operating a special train composed of a locomotive, a 50-ton hopper loaded with 54 tons of scrap iron, and a caboose with recording apparatus. Records were made on a 16-channel oscillograph of temperatures in the axles, bearings and at the top of the box. All packing was removed from test boxes on the hopper and the train was operated at 35 mph.

Within six miles the car had a hot box; the brass broke within 12 miles; the journal wore through the wedge in 20 miles; and the temperature of the axle was 1,800-deg F in 28 miles when the test was stopped. At the conclusion of the test the temperature was going up at the rate of 200-deg F each 30 sec. Further work was to be done and may even include burning off an axle. Among things to be checked is the copper penetration caused by this overheating.

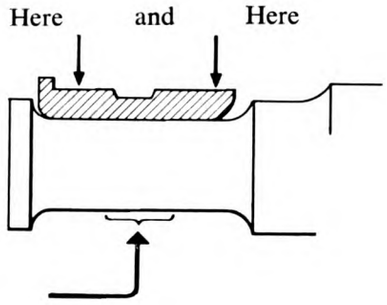
W. M. Keller summarized his talk on the journal bearing situation by stating that progress is being made but that developments must lead to arrangements which require less servicing and less attention. The committee warned that the present hot box situation can well lead to the eventual mandatory use of roller bearings

Here Are Some Things W. M. Keller Told CDOA About . . .

Plain Bearing Journal Boxes

During a brief chalk talk before the recent Car Department Officers Association, W. M. Keller, AAR Assistant Vice President and Director of Research, discussed some of the principles and pressing problems involved in the present plain bearing journal box.

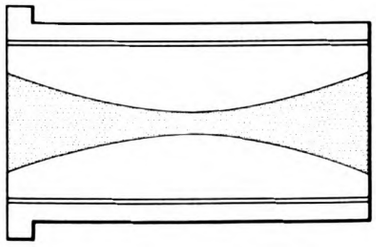
① Grooved back in center of the present journal bearing puts the loads . . .



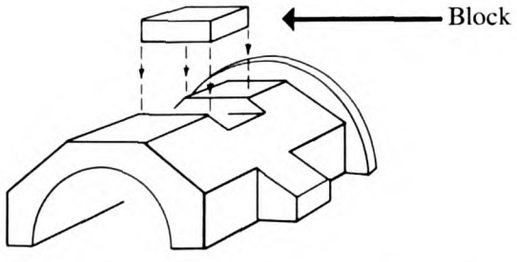
But, the best oil film is HERE

SO, the grooved back puts the loads on the surfaces with the *poorest* lubrication.

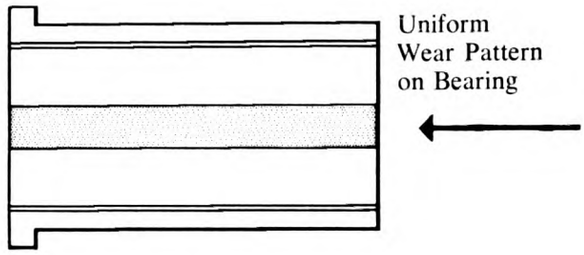
② Norfolk & Western looked at typical wear pattern for this standard journal loading arrangement . . .



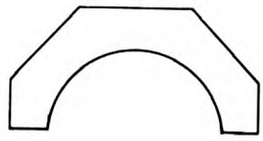
Then, N&W applied a block in the groove on the center of the back of the bearing so the load was applied at the center . . .



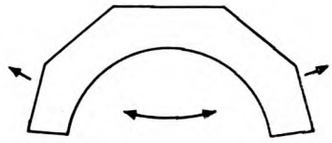
Tests then showed the N&W that a uniform wear pattern was produced with this "central" loading.



③ Standard journal bearing installed on a cool journal will be 50 to 100-deg hotter after the car has run only a short distance and even though the bearing is operating properly.

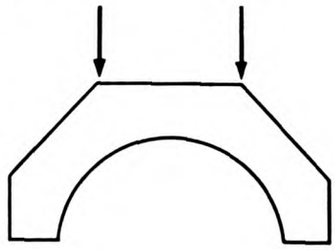


The shape and design of this casting can cause it to open up when it heats to normal operating temperatures. When it cools after this there is the remote possibility that it might "seize" on the journal.



④ Along with uneven loading along length of the journal (Part 1), the AAR has been finding it to be undesirable to have anything but central loading across the diameter of the journal.

This is approximately the loading that comes from the present standard 78-in. radius wedge.



⑤ AAR sees 50-in. radius wedge as a method for achieving "central" loading across the journal, *but* a change in the back of the bearing would be necessary to produce "central" loading along the journal.

Among Mr. Keller's other points:

(a) Return to pre-war bearing ¼-in. longer cannot be complete solution for excessive lateral which can reach a total of 2⅜-in. in a worn truck.

(b) Railroads "don't have much of a seal now" for back of journal box. The AAR-designed dust guard has been tested for movement on and off the dust guard seat and has operated well. Without journal stops, any type of rear seal must be watched because of possible damage during severe car impacts.

Officers Coordinated Mechanical Associations 1957-58

Committee of the Coordinated Associations

Chairman: J. L. Robson, chief mechanical officer, Great Northern

J. A. Welsch, general superintendent motive power, Illinois Central

T. T. Blickle, general manager-mechanical department, Atchison, Topeka & Santa Fe

Secretary: J. D. Ristine, 80 East Jackson st., Chicago

(Committee includes also the president and secretary of each of the coordinated associations)

Air Brake Association

President: C. C. Maynard, general supervisor air-brake and steam-heat equipment, Canadian National

Vice presidents:

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A. M. Malmgren, general diesel and air-brake supervisor, St. Louis-San Francisco

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Vice presidents:

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J. F. McMullen, superintendent car department, Erie

C. E. Barrett, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific

C. T. Graves, assistant chief engineer-tank cars, General American Transportation Corp.

Secretary-treasurer: F. H. Stremmel, (assistant to secretary, AAR Mechanical Division), 6536 North Oxford avenue, Chicago

Locomotive Maintenance Officers' Association

President: F. R. Denney, mechanical superintendent, New Orleans Union Passenger Terminal

Vice presidents:

E. V. Myers, superintendent motive power, St. Louis Southwestern

W. E. Lehr, superintendent motive power, Lehigh Valley

O. L. Hope, mechanical superintendent, Missouri Pacific

R. E. Harrison, supervisor diesel locomotive maintenance, Southern Pacific

Secretary-treasurer: C. M. Lipscomb, general clerk to terminal master mechanic, Missouri Pacific, 1721 Parker street, North Little Rock, Ark.

Railway Fuel and Traveling Engineers Association

President: O. D. Teeter, assistant freight traffic manager, Denver & Rio Grande Western

Vice-presidents:

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C. M. Moddrell, system supervisor, fuel and locomotive performance, Northern Pacific

J. S. Swan, superintendent motive power-operation, Louisville & Nashville.

Secretary-treasurer: L. H. Peters, 139 West Van Buren street, Chicago 5

Allied Railway Supply Association

President: C. R. Busch, vice-president and manager sales, Unit Truck Corp.

Vice presidents:

Geo. L. Green, vice-president, Pullman Standard Car Manufacturing Co.

H. C. Hallberg, president, Waugh Equipment Co.

D. I. Packard, president and general manager, Brandon Equipment Co.

Secretary: J. G. Rees, Westinghouse Air Brake Co., Wilmerding, Pa.

Executive secretary: J. D. Ristine, 80 East Jackson st., Chicago

Treasurer: C. E. Grigsby, vice-president—sales, American Steel Foundries

Union Pacific Has Answer to . . .

Box Car End Liner Problem

Steel and wooden end lining consisting of a metal shape formed of dovetailed channels filled with wooden inserts, has been applied to 2,000 new box cars by the Union Pacific.

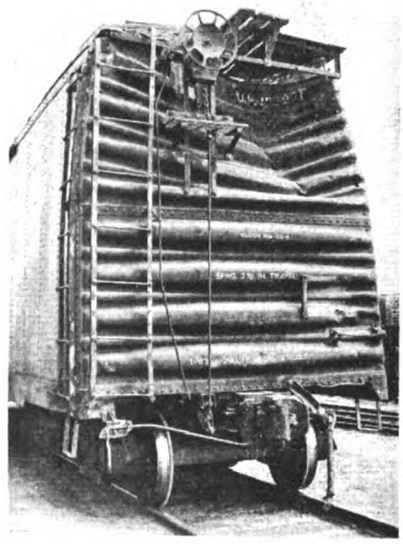
One of the most vexing problems in box car maintenance is the frequent necessity for renewal of broken and missing lining boards. The UP mechanical department decided there must be some way to provide an end lining that would be more substantial than the conventional tongue and groove or plywood lining. If this could be done, the supply of cars suitable for high class loading would be increased, car-days out of service reduced, damage to lading minimized, and the expense of frequent renewal of lining eliminated.

Working in conjunction with the Standard Railway Equipment Manufacturing Company's research and engineering departments, a design was developed that gives a more substantial structure, helps protect the lading, and strengthens the corrugated steel ends from damage caused by shifted loads. It eliminates the necessity for securing end lining by nails which frequently protrude and damage the lading and provides a positive seal to prevent contamination from materials accumulated behind the end lining.

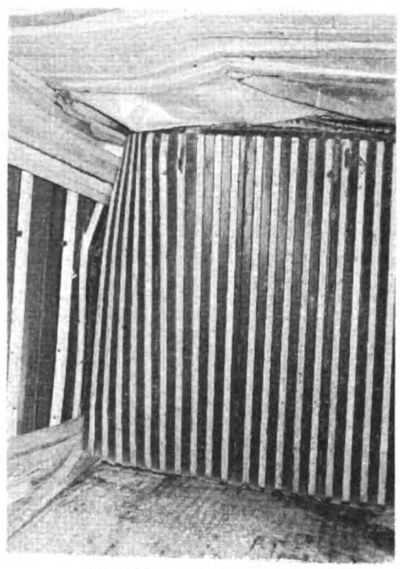
In a typical installation, the lining for each end of car is of four separate dovetailed metal shapes, each section being equal to about one-fourth of the inside width of car. Before installing, the dovetailed channels in each section are filled with wooden inserts which provide alternate metal and wooden sections facing the interior of the car. In this application, filler pieces used in the channels adjoining the side lining and in the channels where the sections are joined together, are applied after the sections are in place, being secured by countersunk stud bolts.

Another method of application is to assemble the complete end section and insert the filler strips in all dovetail sections before installing the assembly in car. Either installation permits the renewal of individual wood inserts without disturbing other sections.

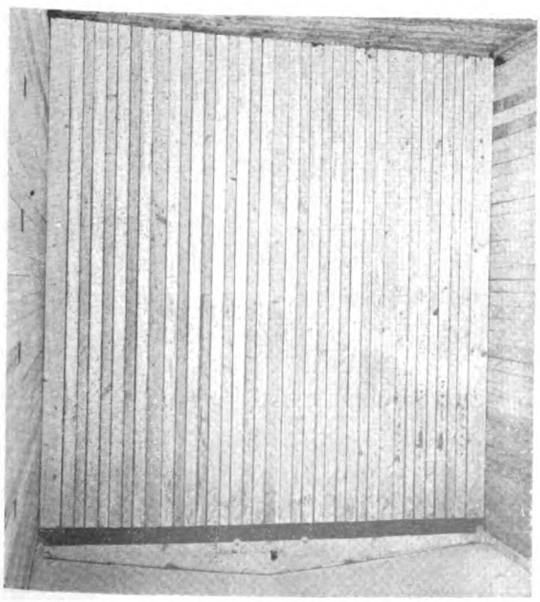
The cheaper grades of lumber adequately serve the purpose of the wood inserts. Oxychloride cement, plastic or similar materials can be substituted to fill the dovetail sections for nailing surfaces.

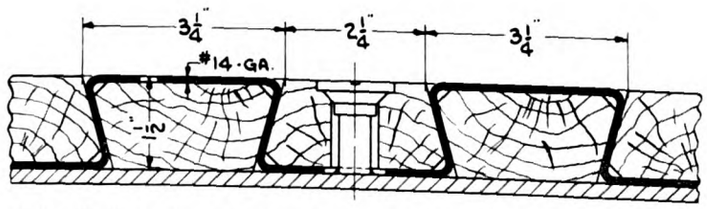


A terrific wallop . . .



And the end liner takes it

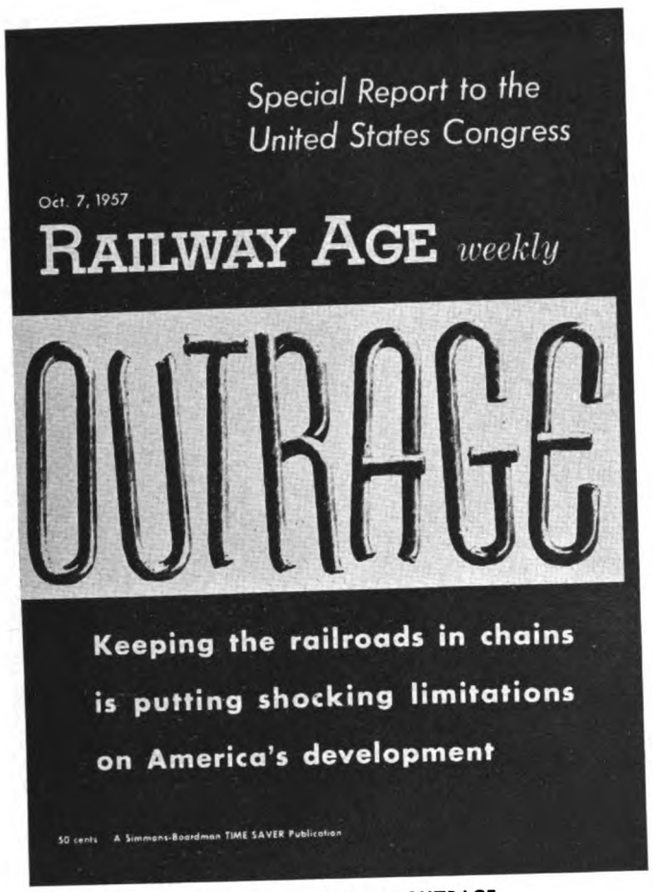




Filler blocks can't come out of channels. Countersunk heads eliminate projections on panel face and facilitate removal of broken inserts

End panel of four sections is completely assembled for new car application. Recessed angle at top of car holds panel in place, with stud bolts at bottom.

Laying Railroad Story on the Line



Government treatment of railroads is an OUTRAGE

Restricted by an archaic system of regulation, taxed to near confiscation by unequal laws and forced to compete in a fairyland of subsidized competition, today's railroads are forced to do business under conditions like no other industry.

These were the cards put squarely on the table in the October 7 Railway Age—companion publication to this magazine. In a Special Report to Congress, Railway Age charged that competitors to railroads "have been given every card in the deck." No wonder railroad earnings are low, no wonder railroads have a tough time obtaining funds just to stay even. The page reproductions shown here illustrate how that message was presented.

The report stressed how railroads, in imaginative management, inventiveness and advanced engineering are second "to no other industry." But, the report said, railroads aren't allowed to do the job they could do because they're being choked to death "by inequalities and an archaic system of regulation established in the last century."

Who's kidding whom...

...that trucks, cars, and buses could carry the full load

Trains have been, are, and must continue to be the bedrock foundation on which America is built.

Everywhere, these days, the happy mantic of prosperity lies across the land. The nation's factories and farms take in vast stores of supplies and pour out goods in a fantastic river—a river that reaches into every city and hamlet. Yet every molecule of this output, every refrigerator, every lump of coal, every grain of wheat must be moved from where it's produced to where it can be used. Without modern transportation, this country could not prosper. No other area of the world depends on transportation as North America does.

It is not difficult to assay the value of America's railroads today. They alone provide the really vital low-cost long-and-short-haul mass transportation. They keep prices from booming, safeguard nationwide markets and protect millions of jobs. Without trains, west coast fruits would have no market in the east, prices of eastern products would soar in the west. Basic raw materials would skyrocket in cost. Take a look at a single figure: to move a ton of freight a mile costs an average of 1.5 cents by rail, over three times that much by highway.

The last war gave us a good look at the basic importance of trains. With autos rationed, gasoline rationed, tires rationed, where would we have been without our trains?

Only railroads have the built-in capacity, the elasticity to expand swiftly, expertly and safely in wartime emergencies. Small wonder the industry still talks proudly of what it did in World War II. Unlike trucks, or airlines, or automobiles, or other transportation agencies, the nature of the railroads enabled them to accomplish a modern transportation miracle. Faced with the same shortages, the same restrictions in materials and manpower, they swelled their ton-mile output to vast proportions. Look at the record: they moved nearly twice their prewar volume of freight and better than three times their pre-war passenger traffic.

Without the railroads' inherent readiness and adaptability, America couldn't have made the grade. Detroit tanks could not have won battles in Germany. If this wartime experience proved anything, it's the nation's stake in a strong and modern railroad system. The country simply must keep its defenses ready.

Yet the railroads today are being choked to death by inequalities and an archaic system of regulation established in the last century. If this strangulation of our "low cost mass transportation carrier" continues, what will be the future of our cities, our highways, our defense, our ability to compete for world markets?

What's happening to the railroads? Far from expanding, many of them are having to contract and retrench. There are today 40,000 fewer freight cars than just ten years ago; 7,000 fewer passenger cars than when World War II began. Tracks in service have declined by 15,000 miles since 1940. To put it bluntly, our railroads are having a rough time trying to hold their own, to stay as big and as vital as they once were. An industry grows or it goes. Restrict the railroads, bind them, hold them back, keep them non-competitive in a competitive economy and who gains? Nobody, for very long. As railroads ride into a crisis of misunderstanding, inattention and neglect, so does every producer and every consumer, every citizen and every city.

Just see how desperate the railroad situation really is——→

The nation needs its railroads. They're the one really vital "low cost common carrier."

What the Railroads (1) Can Do...

In imaginative management, inventiveness and advanced engineering, the railroads are second to no other industry. Just look at some of the things they're doing:

Continuous rail

New kinds of rail, some welded at the "crossed joint," and everywhere stronger, are being fitted into railroad lines every year. This is the kind of progressive action that railroads can take, and must take.

More and better freight cars

Industry engineers, as well, have the know-how and techniques to build a fresh, modern freight car fleet. However, merely keeping up with replacement needs poses a huge and unsolved financial problem.

New trains, modern stations

The nation's travelers, railroads realize, could be served better with more top-quality trains and more stations with real "go-places" appeal. Wanting them is one thing; money to pay for them is another.

Fast communications

Radio in train operation, closed-circuit TV in yards and stations—these are examples of today's railroad tools. But to increase our railroads' value to the nation, such things are needed on a grand scale.

Better track

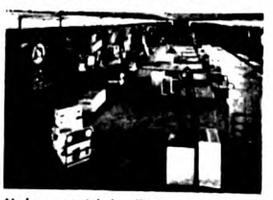
A giant machine scrapes up ballast from the track shoulders and deposits it as required ahead of mechanized tie tampers. Mere equipment like this could put railways in shape for any demand, peace or war.

Versatile new transportation

Piggybacking is creating new traffic patterns. As transport needs change, railroads do change. Already, dozens of rail-haul services of the rail-highway concept to broader, their services to shippers.

New ideas in traffic control

Improved switch and signal devices permit great stretches of track to be controlled from a single point. Trains keep moving, track is kept busy. These systems are growing, but they could grow faster.



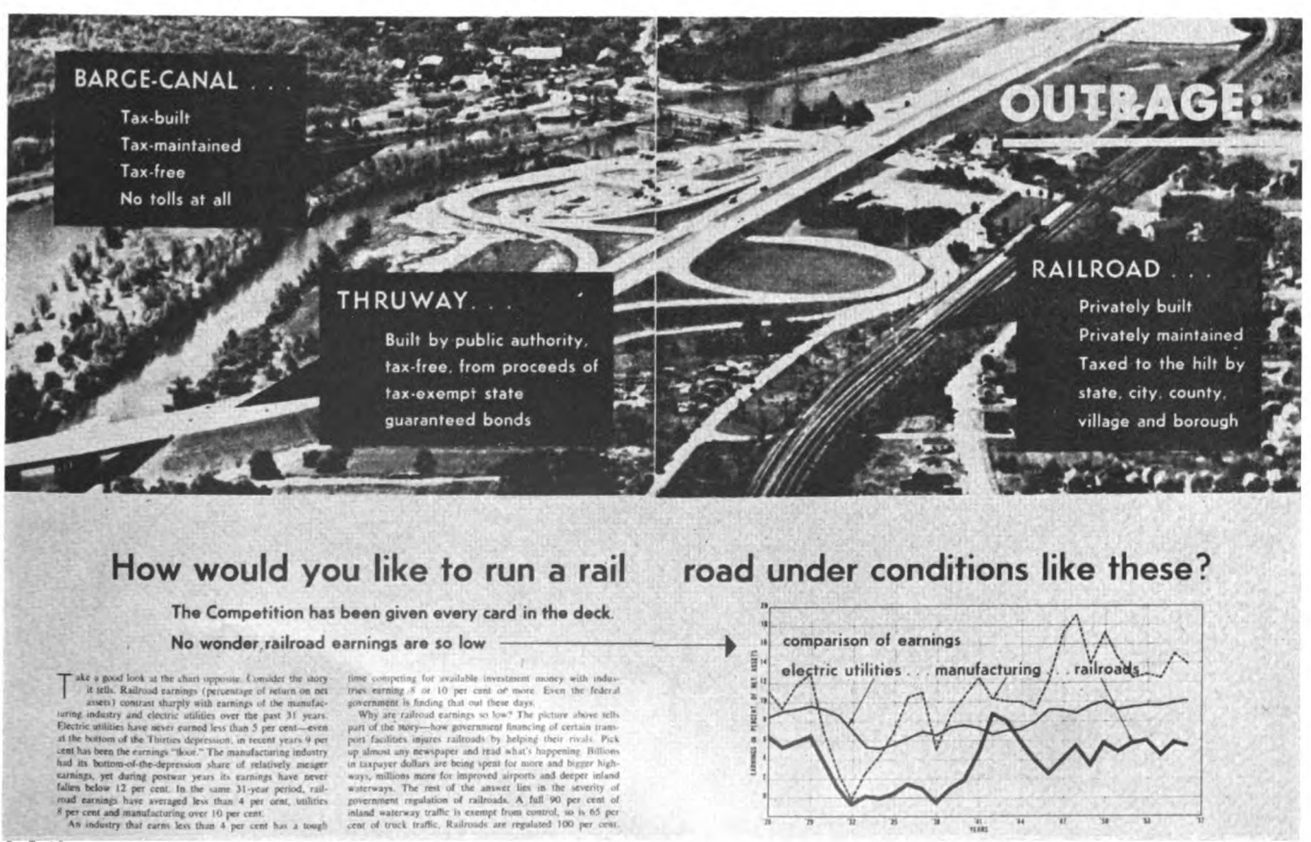
Modern materials handling

Railroads spend all they can afford on new ways to handle freight—like this endless conveyor in a freighthouse. All that holds back hundreds of such installations is simply the shortage of money.

...and what they're (2) Allowed to Do are two different things

The plain fact is that they're not allowed to make enough money to put their modern, advanced ideas into broad effect——————▶

Railroads are progressive and anxious to grow; only the lack of money holds them back.



How would you like to run a rail road under conditions like these?

The Competition has been given every card in the deck.

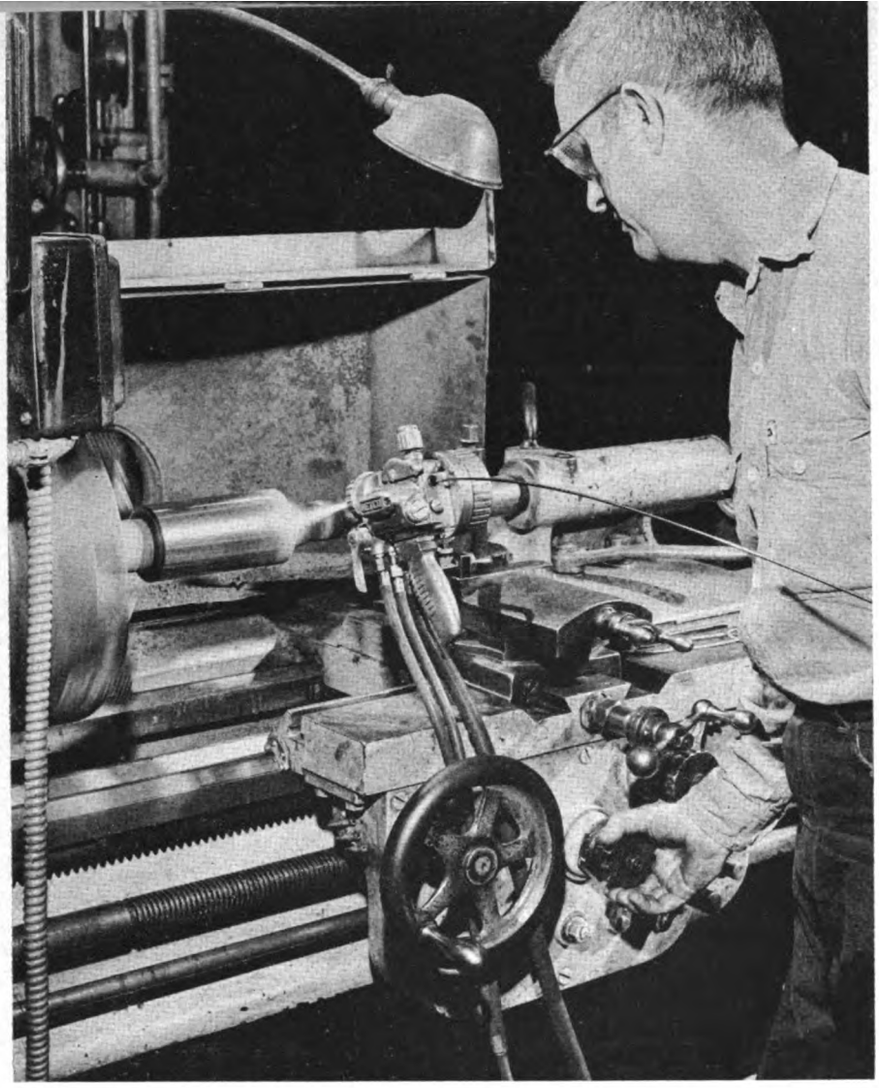
No wonder railroad earnings are so low ——————▶

Take a good look at the chart opposite. Consider the story it tells. Railroad earnings (percentage of return on net assets) contrast sharply with earnings of the manufacturing industry and electric utilities over the past 31 years. Electric utilities have never earned less than 5 per cent—even at the bottom of the Thirties depression, in recent years 9 per cent has been the earnings "floor." The manufacturing industry had its bottom-of-the-depression share of relatively meager earnings, yet during postwar years its earnings have never fallen below 12 per cent. In the same 31-year period, railroad earnings have averaged less than 4 per cent, utilities 8 per cent and manufacturing over 10 per cent.

An industry that earns less than 4 per cent has a tough time competing for available investment money with industries earning 8 or 10 per cent or more. Even the federal government is finding that out these days.

Why are railroad earnings so low? The picture above tells part of the story—how government financing of certain transport facilities injures railroads by helping their rivals. Pick up almost any newspaper and read what's happening. Billions in taxpayer dollars are being spent for more and bigger highways, millions more for improved airports and deeper inland waterways. The rest of the answer lies in the severity of government regulation of railroads. A full 90 per cent of inland waterway traffic is exempt from control, so is 65 per cent of truck traffic. Railroads are regulated 100 per cent.

But what happens? Competitors continue to get government help and grow stronger all the time.



Metal spray is applied to wrist pin. Care must be taken to insure greaseless surface before spray is applied.

On the Milwaukee . . .

Metal Spray Reclaims Engine Parts

Prior to April 1953 a large stockpile of pistons, cylinder liners and wrist pins were kept on hand at the Milwaukee shops in Milwaukee, to replace worn out assemblies in locomotives shopped for overhaul. After over four years' use of metallizing equipment developed by Metallizing Engineering Company, the company has made substantial savings in the cost of the reclamation of these parts, with a drop of over 95 per cent in inventory—now an inventory of only 200 is maintained. Similar reductions of other items have been accomplished.

Cylinder liners represent a feature piece of equipment now being reclaimed. With 6 to 16 liners in each locomotive, the replacement constituted a major problem for the (*Continued on page 42*)

Here's What Another Major Railroad Saves by Metallizing

Name of part	Pieces per year	Replacement cost	Metallizing cost	Yearly savings
12-12-752-2 cylinder liners 608 Baldwin-Lima-Hamilton	50	$15,091.50	$ 490.00	$14,601.50
52111B Alco 539 cylinder liners	50	7,440.00	490.00	6,950.00
752-2-Lima-Hamilton cylinder liners	50	6,750.00	490.00	6,260.00
AFB 652 E-C5 F-M roller cap	300	16,830.00	2,010.00	14,820.00
8091536 EMD blower shaft	24	386.64	191.60	195.04
814967 EMD cam shaft	10	1,569.50	62.00	1,507.50
8085768 EMD jack shaft	10	1,204.00	137.50	1,066.50
C-6822A 10 FB-B F-M injector contral shafts	216	3,542.40	626.40	2,916.00
			Total yearly savings —	$48,316.54

HOW TO

Learn About Air Brakes

... AND HAVE FUN DOING IT

24-RL Automatic Brake Valves

Installment 1G

D-24 MC Pressure Maintaining Brake Valve

This is the seventh installment on the 24-RL Equipment in the Air Brake in Color Schematics series. For the 1F installment see Page 53 of the September 1957, issue.

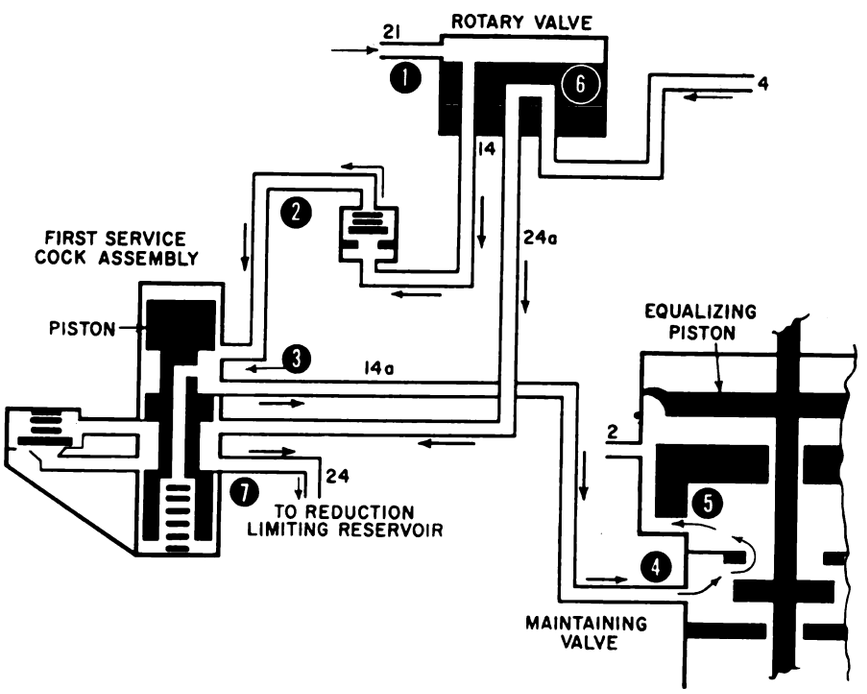
First Service Operation (Sketch 18)

The first service valve has a spool valve with "O" rings in place of the older type plug cut-out cock. When the handle is moved to *IN* position, passage 14, which is feed-valve-supplied air, is connected through this spool valve (Piston) to passage *14a*. This permits feed valve air to flow to the maintaining valve in the equalizing portion and maintains pressure against brake pipe leakage during first service applications. Passage *24a* is connected through the spool valve to passage *24*.

During a first service application, these passages connect equalizing reservoir from chamber *D* to the reduction-limiting reservoir for the purpose of obtaining a light controlled drop of chamber *D* pressure. When the handle is moved to its *OUT* position, communication between *14* and *14a* is cut off, making it impossible to obtain a first service brake application.

Passage *24*, however, is now connected through the spool valve and a ball-and-flat check to passage *24a*. This connection is made so that reduction-limiting reservoir pressure can be reduced when it is desired to make a brake pipe reduction on top of a penalty brake application with the first service feature cut out. To color this sketch, proceed as follows:

With an orange pencil, color passage *21*, the space above the rotary valve, passage *14* and through the right-hand check valve into the piston. Fill in both right and left hand cavities and go down through the piston into the spring chamber, passage *14a* and part way through the open maintaining valve in the equalizing portion. Dampen and allow to dry.



Sketch 18
First Service Operation

1. Feed valve air through rotary valve, through passage 14 to under side of check valve in First Service Assembly.
2. Check valve to piston.
3. Around piston into passage 14a.
4. Passage 14a into equalizing portion beneath maintaining valve.
5. If maintaining valve is held open by the equalizing piston, maintaining air passes maintaining valve into passage 2b and 2 and to the brake pipe.
6. Equalizing reservoir air flows through rotary valve into passage 24a.
7. From passage 24a around the piston and into passage 24 and to the reduction limiting reservoir.

With the yellow pencil, start above the maintaining valve where the orange color stops. Fill in passage *2* and the space beneath the equalizing piston. Dampen and allow to dry. With a light green pencil, fill in passage *4* and go into the rotary valve cavity. Dampen and dry.

With a dark green pencil, start in the cavity where the light green ended. Fill in passages *24* and *24a*, the cavity around the piston, and the space above and below the left-hand check valve. Dampen; let dry.

Emergency Operation (Sketch 19)

Sketch 19 shows schematically the layout of the Emergency Valve, Rotary Valve, and Equalizing Portion when an emergency application is initiated by the brake valve. In this position, the rotary valve connects various ports and passages as indicated previously under "Rotary Valve Connections". The emergency valve plunger unseats the emergency pilot valve (not shown) which permits the emergency valve to quickly unseat and provide a large and direct passage from the brake and passage *1* to the exhaust, so that an emergency rate of brake pipe reduction is obtained.

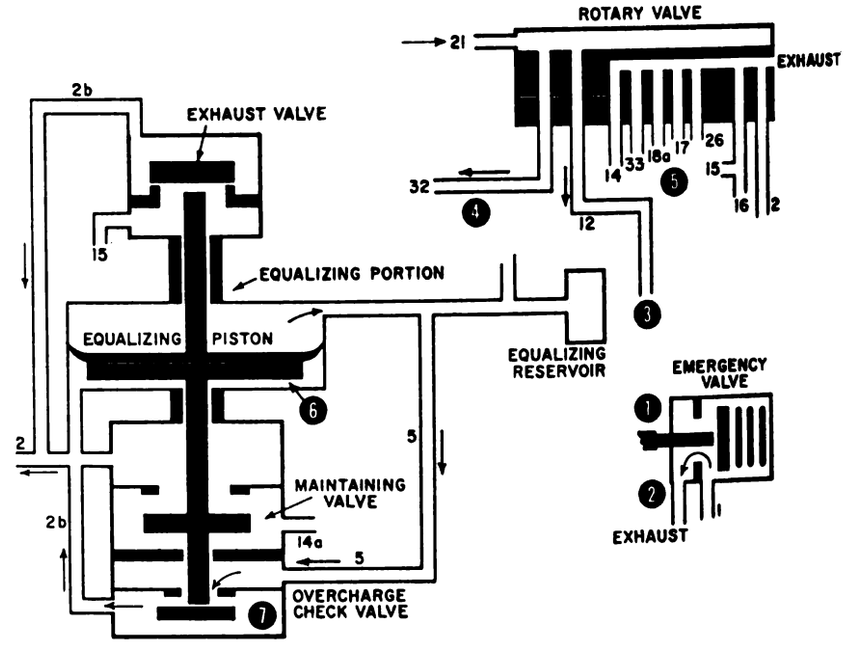
At the equalizing portion, the reduction of brake pipe pressure under the piston permits the higher equalizing reservoir pressure in chamber *D* above the piston to move the piston to its lowest position. In this position the overcharge check valve is unseated. This permits equalizing reservoir air to flow past the open check valve into the brake pipe passages and to the atmosphere past the open emergency valve. Thus the equalizing reservoir volume is connected and vented to atmosphere during emergency application.

To color sketch 19, proceed as follows: With an orange pencil, color passage *21*, the entire space above the rotary valve and passages *32* and *12*. In orange dashes, color passage *14* to the exhaust passage in the rotary valve, passage *14a*, and the space above and below the open maintaining valve in the equalizing portion.

Assuming that the emergency reduction of brake pipe air has just taken place, brake pipe and equalizing reservoir pressures have not yet been depleted. The coloring should be solid, rather than in dashes. With a yellow pencil, color passage *1* and the space around the emergency valve, carrying the color out the passage marked *EX*. Color the space above the exhaust (equalizing discharge) valve, passages *2b* and *2*, the space above the maintaining valve, under the equalizing piston, and below the overcharge check valve.

In yellow dashes, color the space below the exhaust (equalizing discharge valve) and connecting passage *15;* passages *15*, *16* and *2* at the rotary valve; and into the exhaust passage. Dampen and let dry. With a light green pencil, color passage *5*, chamber *D* above the equalizing piston, equalizing reservoir and the space over the overcharge check valve down to the yellow color below the valve. In light green dashes, color passage *18a* and into the exhaust passage in the rotary valve. Dampen and let dry.

Color in gray dashes, passages *17* and *26*, and into the exhaust passage in the rotary valve. Dampen and let dry. Do not color passage 33 at the rotary valve.



Sketch 19

Emergency Operation

1. **Brake Valve in Emergency position. Emergency Check Valve is unseated.**
2. **Brake pipe air flows from passage 1 to EX.**
3. **Feed valve pressure to passage 12 (Power Knock-Out)**
4. **Feed valve pressure to passage 32 and to feed valve control chamber.**
5. **Other passages as indicated, through rotary valve to Exhaust.**
6. **Higher Equalizing reservior pressure has moved equalizing piston to its lowest position.**
7. **Equalizing reservoir air flows past open check valve to brake pipe.**

DROP END LOCKS

KEEP CORNERS FROM SPREADING • WON'T ACCIDENTLY OPEN

The Wine Drop End Lock has an unequalled record for continuous service with minimum maintenance. Progressive developments include the addition of a pry-bar opening to facilitate easier drop and closing, even when the car structure is distorted from hard service.

The 3-way interlocking feature assures positive closure and retains the end and sides in their original relative position by preventing the sides from spreading at the corners. Equipped with the Wine Drop End Balancer in combination, one man closures of the heaviest drop ends is safe, fast and economical.

THE WINE RAILWAY APPLIANCE CO. TOLEDO 9, OHIO

GULF DIESELMOTIVE 7

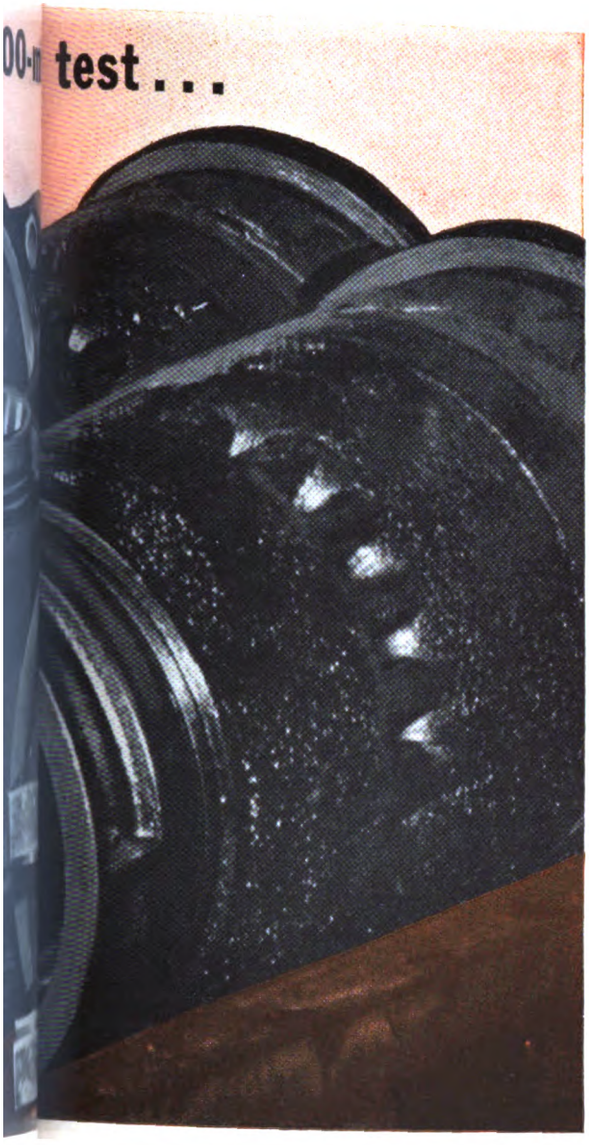
protects rated power of high-output

The pictures tell the story. Gulf's new Dieselmotive 78 keeps engines cleaner — longer. But that's not all. *This new oil enables high-output Diesels to deliver their full rated power . . . under certain conditions, it can actually increase the tonnage ratings!*

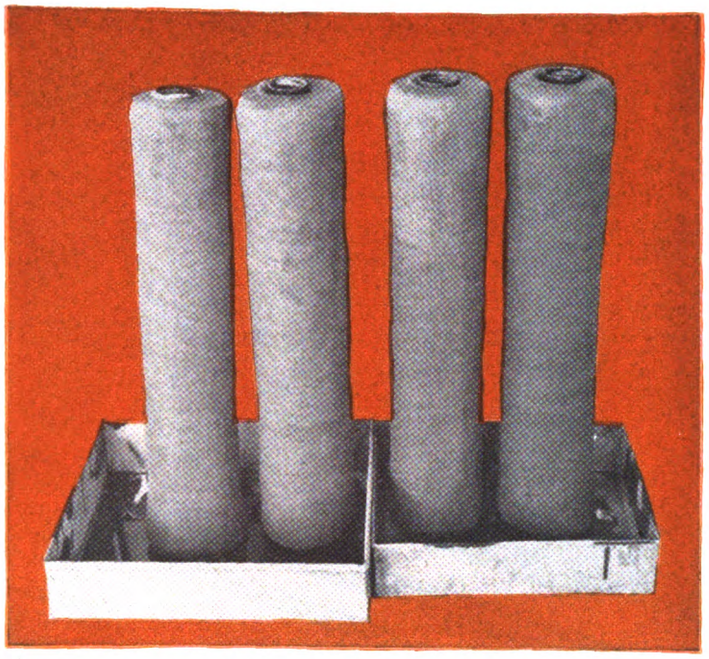
Southern Pacific put Dieselmotive 78 through a series of grueling tests in EMD 567-C units on Southern Pacific lines in Texas and Louisiana. You know the run—from hot and humid lowlands to chilly mountain passes . . . temperatures ranging from 110 to zero degrees. Tough hauls up steep grades... long runs through dust, heat and cold.

After 165,825 miles, the engines were disassembled. Rings, pistons and liners showed amazingly little wear. There were no heavy deposits or varnish anywhere. Main bearing shells were so near-new they were re-installed for further service.

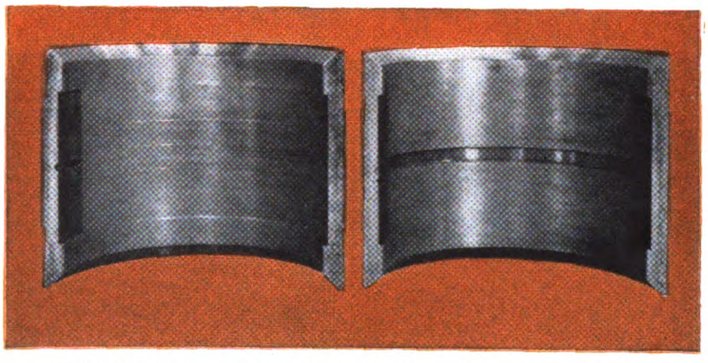
You can see how engines as clean as this deliver all the power built into them. Com-



After 165,825 test miles on Dieselmotive 78, pistons and liners when removed looked like this. All parts were clean, free of deposits and showed negligible wear.



Filters are free of heavy sludge. Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils. This additive reserve insures cleaner engines, less wear, than ever before.



Note clean appearance of connecting rod bearings immediately after removal from engines. Gulf Dieselmotive 78 retains its stability and lubricity even when subjected to high temperatures for extended periods.

78 OIL

engines

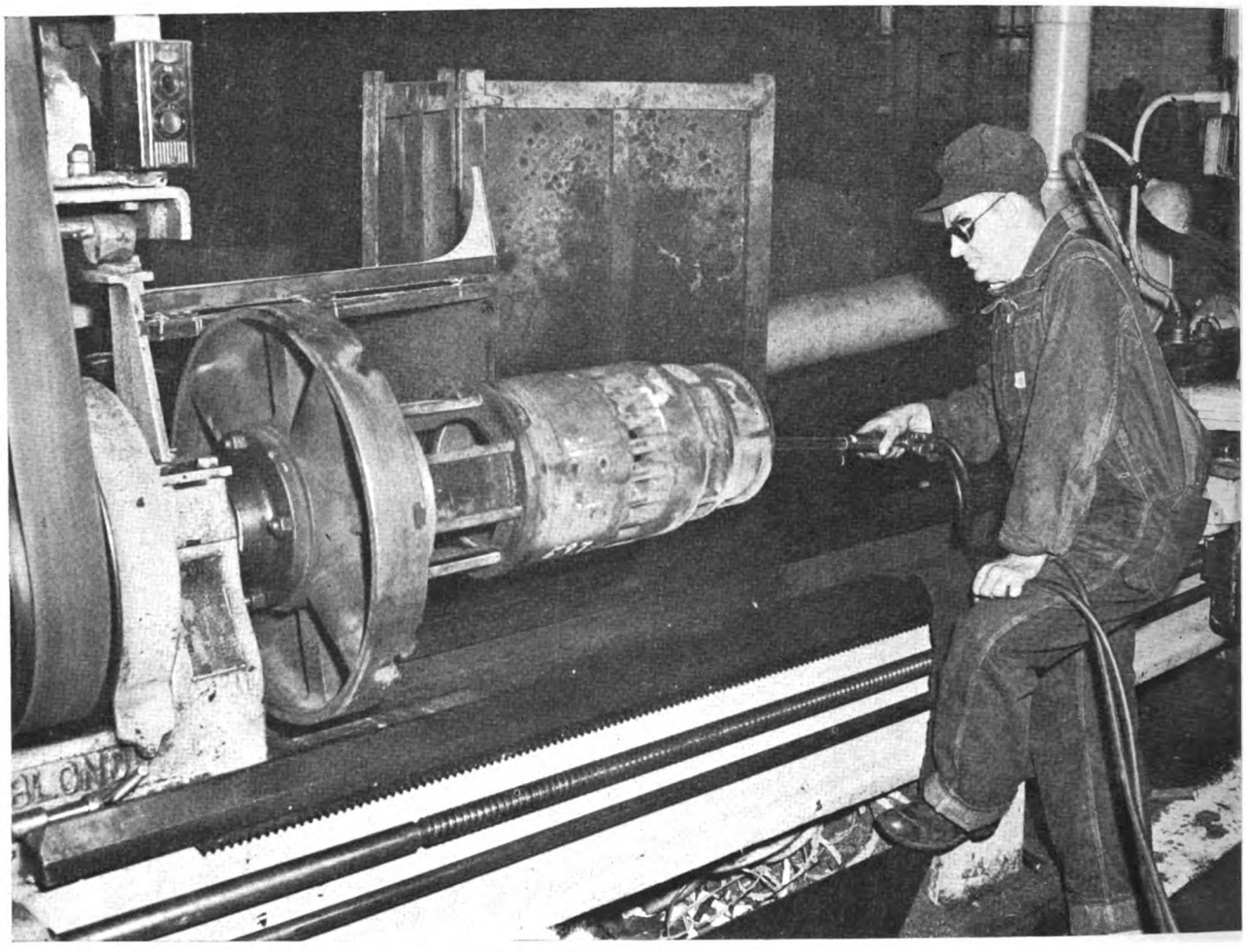
pression is maintained, insuring continued high engine efficiency.

Gulf Dieselmotive 78 is now being demonstrated on the Missouri Pacific and Seaboard Airline Railroads. Why don't you try this new and better oil? Merely contact the Gulf engineer at your nearest Gulf office for any help you need. Or, write for more data.

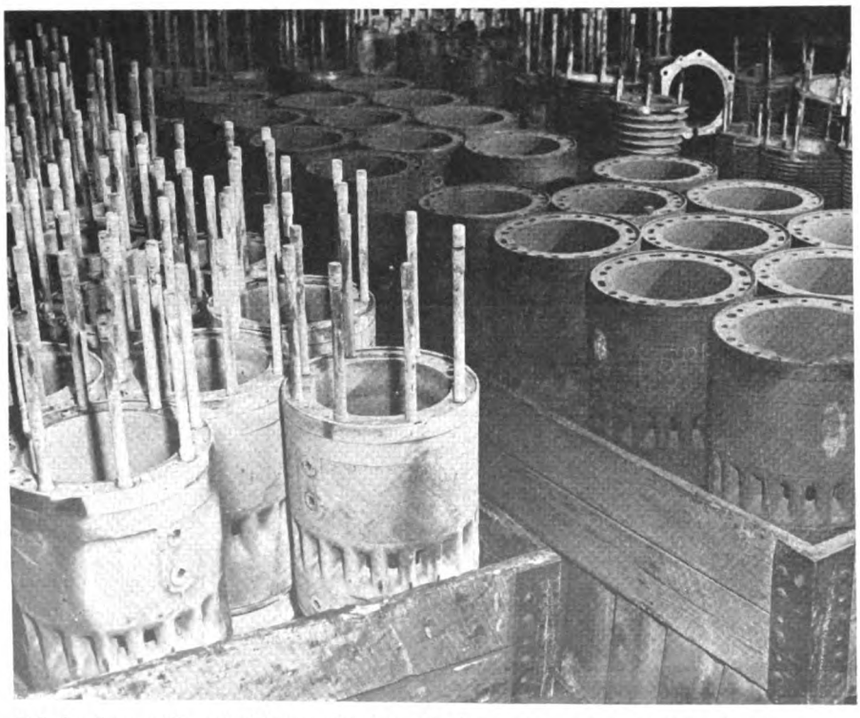
GULF OIL CORPORATION

Dept. DM, Gulf Building, Pittsburgh 19, Pa.

GULF



Cylinder liner gets preheated before application of metal spray.



Cylinder liners with and without studs after cleaning process and ready for metallizing.

(*Continued from page 36*)

railroad. According to company sources, from 300 to 500 liners were scrapped each year. Before the installation of the Metco equipment, a method of reboring twice was used to salvage the liners. After the second reboring, the liners were scrapped after reaching limit of wear. Now the liners are rebored two step sizes and then reclaimed by metal spraying, eliminating the purchase of new liners and costing about one-half that of a new liner.

Shop procedure in preparing the liners for the metal spray consists of cleaning, boring and placing in furnace for degreasing. The liner is then pre-heated, starting at 300 deg F and the metal spray builds up to 400-450 deg F during the operation. The wire used is Spra-Bond and Spra-Steel #25, both ⅛ in. in diameter. Thickness of coating applied is 0.065 in. with the thickness of metal machined in preparation

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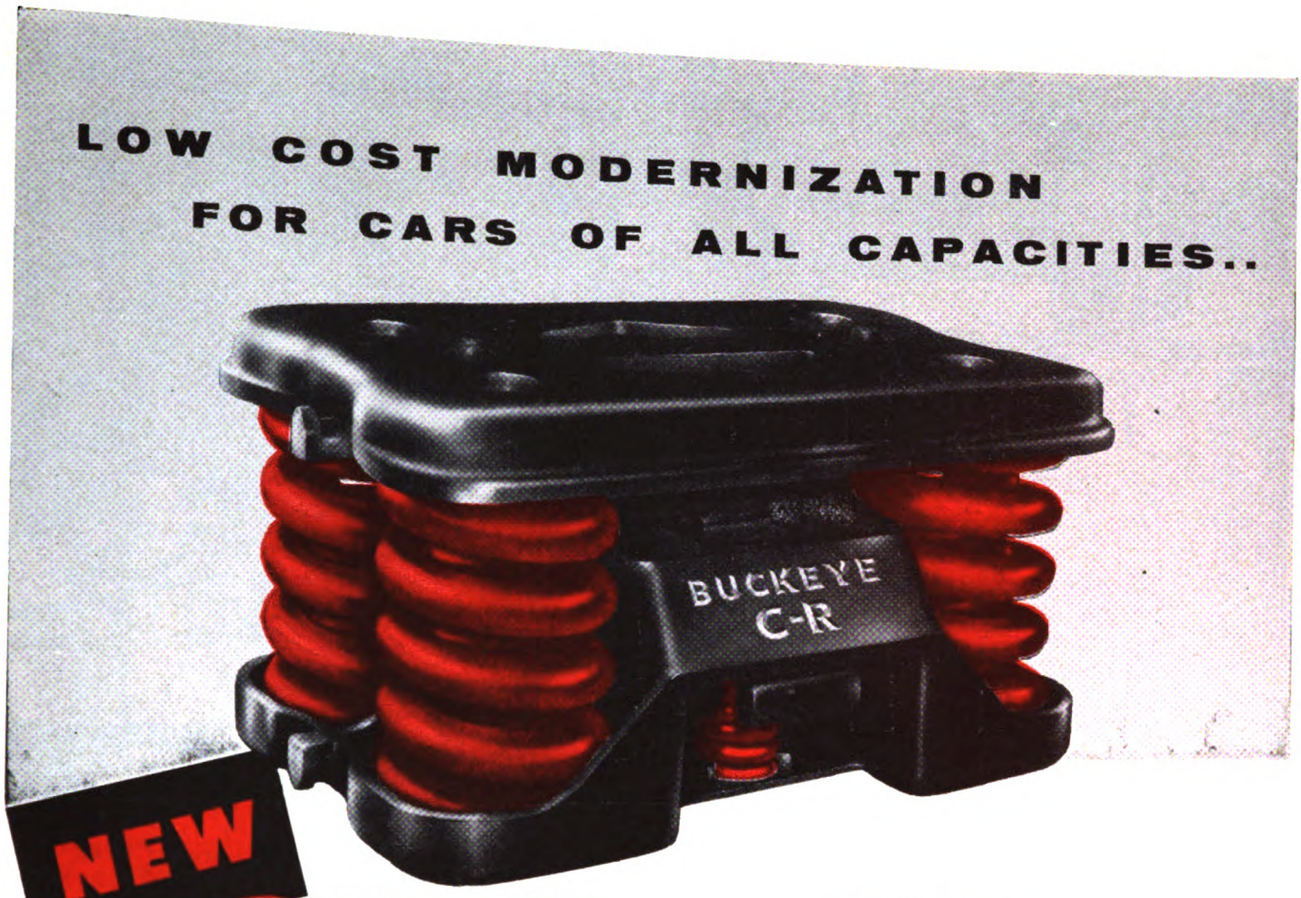

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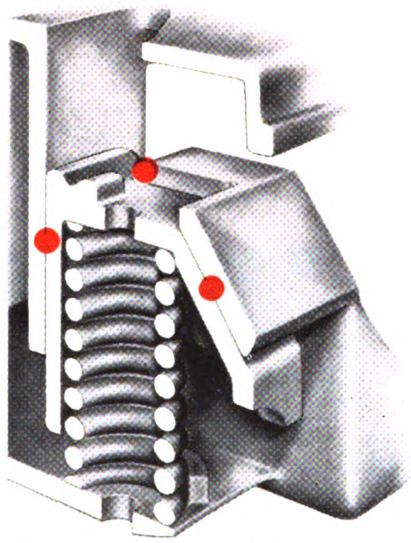

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ST. PAUL, MINN.

Workman adjusts spray gun before metallizing piston.

for spraying being 0.020 in. Time required for the complete process is approximately four hours.

Wrist pin reclamation has been a profitable operation. An engine set of sixteen is handled as a unit to fit in with the shopping program.

When the pin reaches limit of wear, it is cleaned in the Aja-Dip cleaning tank, and checked by Magnaglo for fractures. The pin is then mounted on an expansion mandrel in a Landis grinder and ground dry 0.010 in. undersize to allow coating of about 0.005 in. after finish grinding. Spra-Bond is then applied. A simple mounting fixture holds the spray gun in proper position on a lathe, giving rapid, even deposit of metal. The pin is then wet-ground to finish size.

Wrist pins before and after reclamation.

This operation, like the other parts metal sprayed, requires only one man to prepare and operate the equipment. The cost of reclamation including labor and material is about $6.50 per pin. Approximately six hundred pins each year are salvaged.

Additional items metallized include Woodward governor drive shafts, armature shafts, and various pieces of equipment used in operation of the maintenance shop. Down-time, due to lack of available replacements in company machines, or delay in obtaining same, has largely been eliminated by metallizing many worn parts which were formerly scrapped.

The Metco equipment consists of a 4E gun, a Y gun, Spra-Steel 25 wire, Spra-Babbitt A wire ⅛ in. in diameter, reel, Spra-Bond wire, a wire straightener, flowmeter, and dehydrator to remove moisture from the air.

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High Strength Steel Keeps Car Costs Low

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Ordinary steel can't match the damage-resisting strength of Armco High Strength Steel. What's more, this durable steel lasts longer in service. It has 4 to 6 times the atmospheric corrosion resistance of ordinary steel.

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Send me more information about Armco High Strength Steel.

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(Over 450,000 car sets of Barber Stabilized Trucks Sold)

STANDARD CAR TRUCK COMPANY

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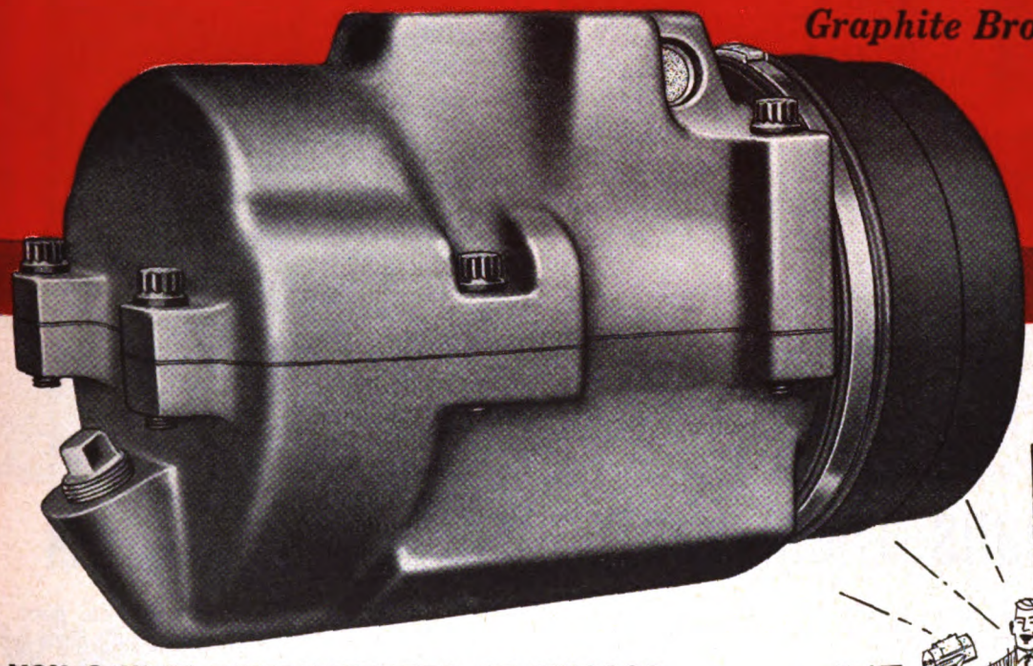
What's more, you'll get the hard-earned railroading experience, engineering skill and continuing maintenance follow-up that have made Barber a trusted name wherever freight cars roll. You'll deal with representatives who know your requirements and how to meet them economically to lick the "hot box" headache.

...announces THE HIGH PERFORMING, ECONOMICAL CHANGE-OVER JOURNAL BEARING FOR AMERICA'S TWO MILLION FREIGHT CARS

(A development of Cleveland Graphite Bronze Company)



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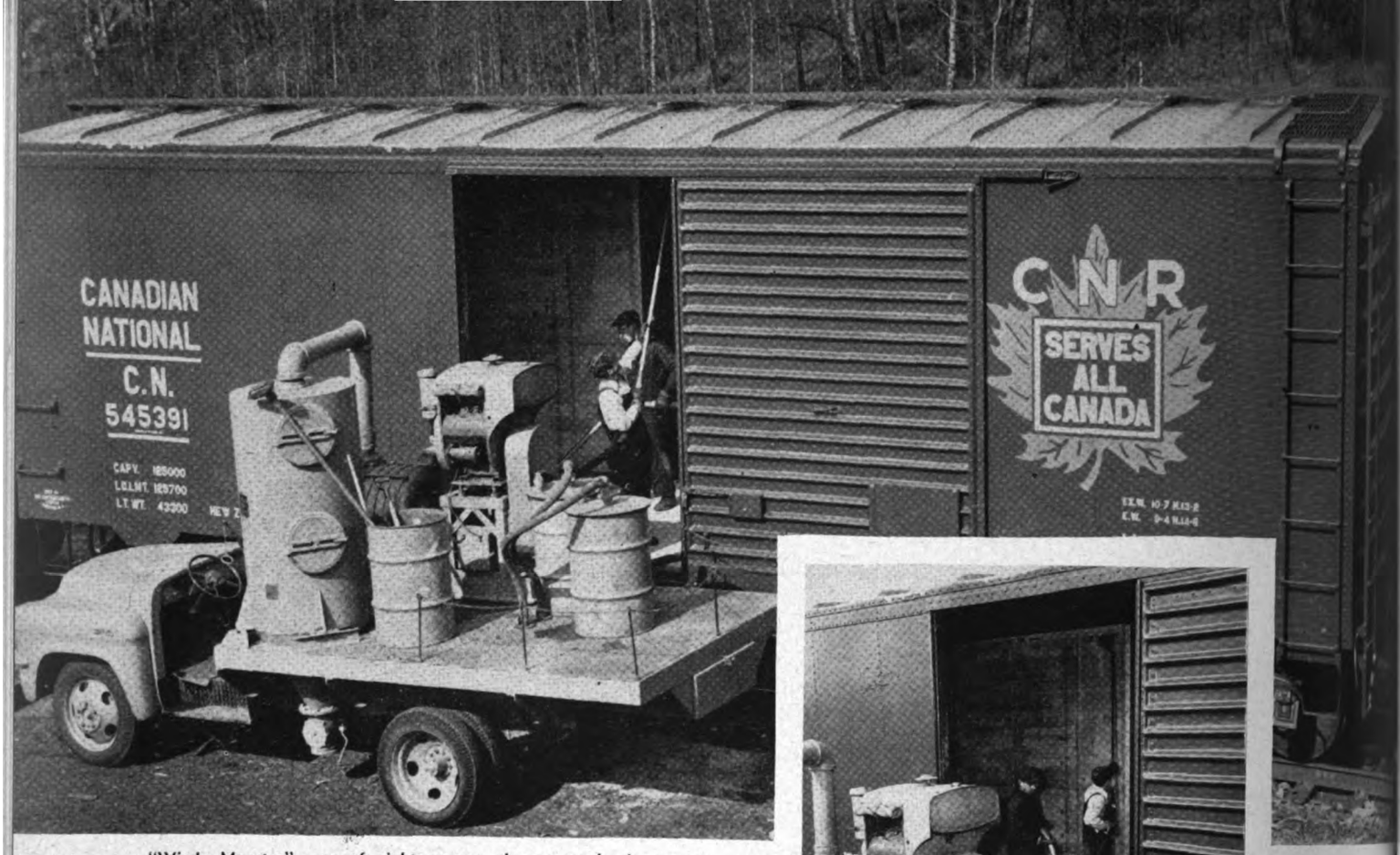

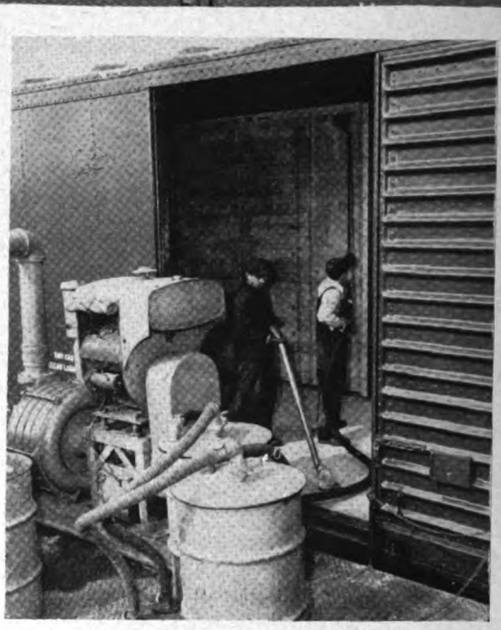

"Windy Monster", one of eight vacuum-cleaner trucks in use on Canadian National at Montreal, has brought dry cleaning time down to 15 minutes. Dry fines are piped into cans on the truck body for easy disposal. High and hard-to-reach corners of CNR box cars are cleaned with long nozzles which two-man crews use. Vacuum suction removes refuse from inaccessible corners and cracks which sweeping would never loosen.

CNR Cleans Them Fast

Mechanization has come to car cleaning on the Canadian National, and the result is faster, more thorough cleaning and reduced labor costs. CNR's Turcot car cleaning yard is situated on the north side of Turcot West Yard in Montreal and holds about 270 cars. Its six tracks have a combined length of 14,000 ft. On each side of each track are roadways for truck movement. Tracks 3 and 4 which pass through a concrete block decontamination building handle four cars.

Cleaning of the cars is broken down into three operations—removal of dunnage, removal of dry fines, and wet cleaning.

For dunnage removal, there are two specially designed trucks. The rear platform of each truck is raised to the level of box car floors and mounted there are two one-cubic-yard "Converto" dump units. The dump units are raised hydraulically. To illuminate box car interiors, each truck is equipped with special 120-v lighting apparatus.

Vacuum cleaning is used for removal of dry fines from box cars, and for this there are eight special trucks. Each has been equipped with a vacuum cleaner; a belt-driven centrifugal exhaust; a 12-cu ft secondary dust separator; and six drums with special lids that form the primary separators. Each truck has two 50-ft lengths of 2-in. vacuum hose. Two trucks are equipped for wet cleaning box car interiors. Each cleaning truck is operated by a two-man gang. Both men perform cleaning work, but one man is responsible for operating the truck and power equipment on it.

Systematic Cleaning

The cleaning operation of the equipment begins after the car has been spotted on the cleaning track. The dunnage truck drives up and its gang opens the doors and cleans out the dunnage—blocking, steel strapping, boards and nails. The vacuum truck follows behind and is spotted at the box car door. The two men enter the car each with a vacuum hose and each vacuums half of the car. If necessary, walls and ceilings are vacuumed.

Inspectors follow and decide whether wet cleaning is necessary. If not, they tag the car as ready for service. In the summer, wet cleaning is done outdoors. During the winter, cars marked for wet cleaning are moved into the decontamination building.

The cleaning yard organization consists of an outside foreman who reports directly to the divisional superintendent, two leading hands who supervise the men engaged in cleaning, and a mechanic who is responsible for the servicing and maintenance of the trucks.

The equipment was developed by CNR engineers working with R. C. Chown, Inc., of Montreal. After tests of all of the new equipment, it is expected that similar trucks will be purchased for use in CNR freight yards all across Canada.

General Electric Locomotive Cables—
wherever environment is a problem

Sand and dust storms, pebbles that fly and cut like bullets, scalding steam, an occasional oil bath or a dousing with detergents or other corrosive cleaning compounds—these are the environmental problems you face with locomotive cables. And as long as the unit is operating, there's motion that causes either simple vibration or severe and constant flexing. You need a cable designed to take this treatment and still deliver economical service life. General Electric Versatol* Geoprene* locomotive cables are designed to meet your toughest service conditions.

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These cables are dependable in over-load conditions, too. When steep grades and heavy hauls cause copper temperatures to rise, the insulation of the Versatol Geoprene cable will carry the load without deteriorating.

G-E locomotive cables are available in a variety of types for all applications (even extreme temperature) right from conveniently located warehouse stocks. For more information, write Section W213-1147, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

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GENERAL ELECTRIC

UP Saves Time Testing 'Streamliner' Brakes

Test device for brake system is suspended from the tight-lock coupler of one of the UP's light-weight coaches while in use.

A special test rack and angle cock-testing device, developed at Albina, Ore., shops of the Union Pacific and subsequently used at other points on the system, gives a unique method for testing the air brakes of passenger trains. The testing job is simplified, labor costs reduced, and 15 to 20 min saved with a nine-car train—an important advantage when turn-around time is limited.

The equipment consists of a fixed test rack housed in a booth set between the tracks in one end of the "Streamliner" shed—or shop, and an angle-cock testing device applied at the other end of the train. The sheet metal booth has a door and large windows to give good visibility down the length of the train and is well-lighted for night operation.

The test rack is equipped with electro-pneumatic and automatic air brake control valves along with all necessary pressure-release valves, gages, lights and a clock required in testing the air brake and signal equipment on up-to-date trains. The two main control valves are mounted on a narrow shelf in front of the operator's position and the rest of the equipment on a back board within easy reach and view of the operator. All electric and air connections are neatly made on the back of the instrument panel. Arrangement is made for easy connection of air and electric lines from the test rack to one end of the train.

The cock testing device is made from an old signal valve with the pop-off plug and electro-magnet removed and other fittings added to give three hose pipe connections: (*right*) to the electric - actuated straight - air trainline; (*center*) to the main trainline; (*left*) to the signal air line. The cock tester is supported from the coupler and the three hoses, made of armored decelostat hose, extend downward about 3 ft for connection to the train air and signal lines.

The procedure followed in making an inbound train brake test with this equipment is as follows: Moisture is blown out of the air supply line and air hoses and electric cable are connected from the test rack to the cars. The cock-testing device is connected to the air hose glad hands at the rear of the train. The train line, signal line, and straight air line cocks to device are then opened.

Automatic Test: With all cocks closed on the test rack panel, the straight air brake valve handle is placed in position No. 6 and the automatic brake valve handle in running position. The train line, straight air pipe, control pipe, and signal line cocks are opened, fully charging the train to 110 psi. To determine if the train is charged, the brake valve is moved to lap position for 5 seconds during which time the brake pipe gage pressure should not drop.

With the brake equipment fully charged, a 6 psi brake pipe reduction is made by moving the automatic brake valve handle to service position, then moving the handle to lap position. After 5 minutes, an inspector walks along the train closing straight air cocks between each car and checking to see that all cars have brakes applied and automatic slack adjusters are operative.

When the release signal is given, the automatic brake valve handle is moved to running position and the brakes inspected to see that all have been released.

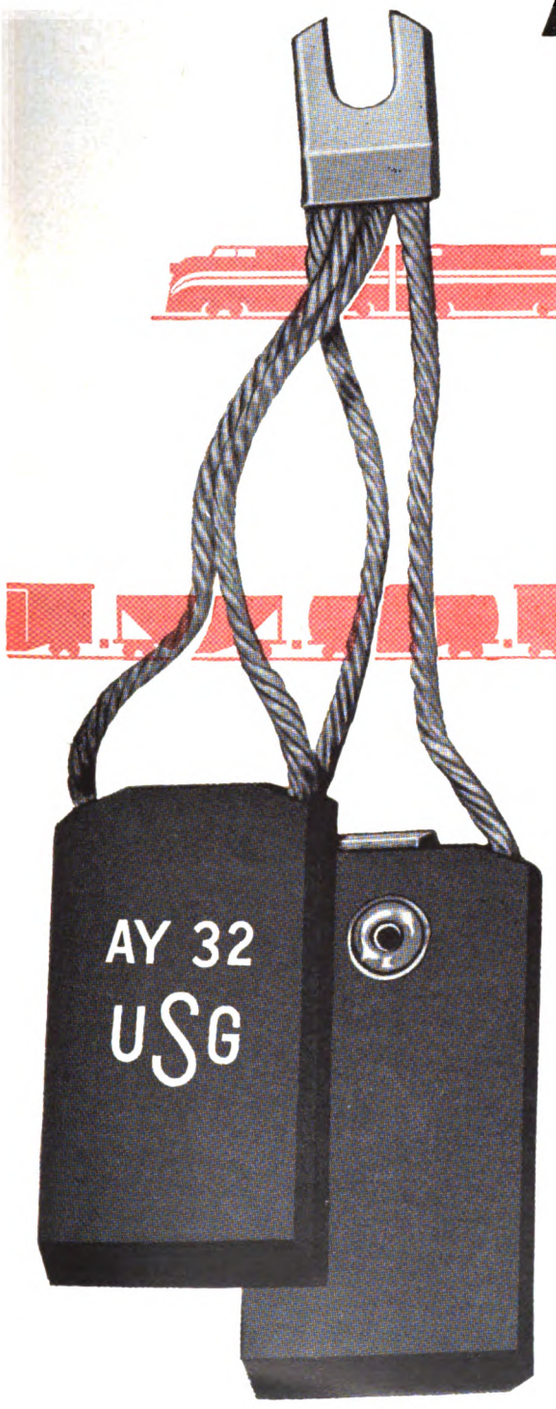
Electric-Pneumatic Test: With each car's straight air isolated and all connectors properly in place through the train, the test rack generator is switched on, the control switch placed in manual position and the reading noted on the ammeter gage which should register about 3 amp. If the reading is below 3 amp., the circuit through the train is not complete. If the ammeter gage reading is correct, the switch is moved to M.C. position, the straight air brake valve handle placed in No. 2 position until 30 psi pressure is shown on the SA gage. The straight air brake valve handle is moved to No. 3 (lap) position and the opposite side of the train is inspected to see that all brakes have applied. When the release signal is given, the straight air valve handle is moved to No. 6 position and all straight air cocks opened on the release walk.

Cock Test: This test can be made only when the device is connected to the rear of the train. After the release signal is received and the brakes released, the signal line cock on the panel is closed, all other cocks being open. While the electric release walk is being made and straight air cocks between cars opened, the signal line pressure is drained by opening the signal exhaust cock on the panel. The exhaust cock is then closed. Before conductor valves on the car are tested, the switch is placed in manual position. With the generator running and the red light on (indicating release circuit through the train is energized), the straight air pressure is increased to 70 psi.

Signal line pressure should not increase until the train line pressure is reduced to 50 psi or less, either by use of the conductor's valve in the car or the automatic brake valve on the test rack.

When train line air pressure is

USG® BRUSHES AY32 AND 2306 ARE THREE WAYS *BETTER*



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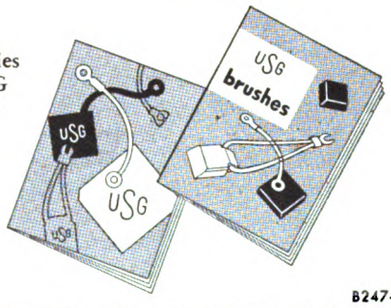
In recent years nearly every reputable brush manufacturer has improved the anchorage of the shunt connections: none, however, are quite as firm or quite as permanent as the method employed on USG Brushes, called STATITE®. The shunt can't be jerked out and, of course, it does not jar loose.

Write for your copies of the latest USG Brush Catalog B-56 and the new USG Brush Grade Supplement.



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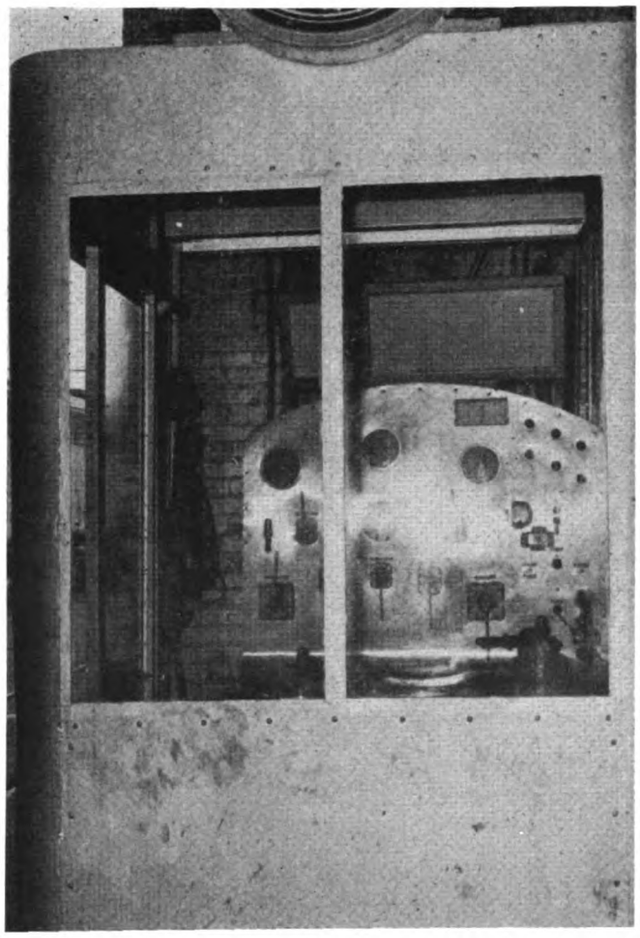
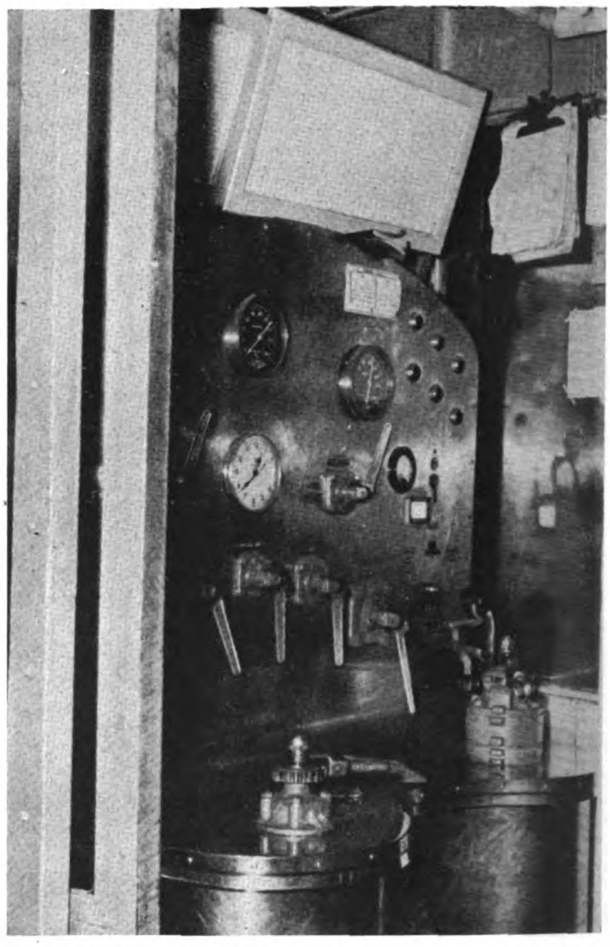


Test cabin is located adjacent to the coach yard tracks at Portland and air tests are made while other work is being done.



Control panel enables test to duplicate all of the locomotive control functions and to make several additional tests.

about 20 psi below straight air line pressure, signal line pressure should start to increase, indicating that all cocks through the train are open. If the signal line pressure fails to rise, this shows that a train line, signal line or straight air line cock is closed.

Leakage Test: After the cock test is made, the generator is switched off and the automatic brake valve handle placed in running position, straight air valve handle in position No. 6, the signal line cock opened and the SA by-pass cock on the rack panel closed.

With the train fully charged, a 15 psi brake-pipe reduction is made by moving the automatic brake valve handle to service position, and then to lap position. The train line cock is closed and brake pipe pressure checked on the gage. If leakage does not exceed 5 psi in one minute, the brake valve handle is moved to running position and the train line cock opened.

The next operation is to turn on the generator, move the control switch to manual position, press the green button (application), and charge straight air line pressure up to 30 psi. The straight air line cock on panel is closed and the SA line pressure watched for one minute. Leakage must not exceed 5 psi. With the test completed, the SA line cock is opened.

The signal line cock is closed and leakage watched for one minute. Leakage must not exceed 3 psi. The signal line cock is opened.

Slow Release Test: With the regular inbound and leakage test completed, the equipment is fully charged and the slow release cock on panel opened. With the brake valve in service position, a 15-lb brake pipe reduction is made, the brake valve returned to lap position, the train line cock closed after 30 sec, and the brake valve placed in running position. Brake pipe pressure on the gage is noted and, after an increase of approximately 5 psi, all brakes should be released. Brakes that do not release indicate a defective control valve which must be corrected. After the signal is received, indicating that the inspection has been completed, the train line cock is opened and equipment fully recharged.

Brake Cylinder Maintaining Test: The brake valve is moved to service position, a 15 psi brake pipe reduction made and the brake valve handle returned to lap position. After 30 sec the train line and slow release cocks on the rack panel are closed and the brake valve immediately moved to running position. A check is made through the train to see if brake cylinder pressure on each car is uniform; also that signal valves are operative, and retainer and conductor valve handles in order.

Any irregularities found on this inspection are corrected. After inspection is complete, train line and slow release cocks are opened.

Outbound Test: This test is made the same as the inbound test with the exception that straight air cocks between the cars are not closed on the walking inspection.

Bar-burned traction motors a problem?

Call your NATIONAL brush man...

TRADE-MARK

Here's how he helped one road slash reconditioning costs!

MURPH VARNEY

At least 70 traction motors a year — laid up because of premature commutator bar burning. That was the problem "National" Carbon Brush Man Murph Varney found on a leading mid-west road. Amazingly, the road felt that resulting down time, parts and labor costs were the unavoidable price of high speed passenger operation.

Murph proved differently by analyzing this road's problem and recommending the right "National" carbon brush to alleviate bar burning. Result: premature removal of traction motors fell *from 70 to 5 a year.*

Murph Varney and his fellow "National" Carbon Brush Men have been solving railroad brush problems for years. Their experience and training — backed by "National" *long term brush development* — make them the logical consultants on any railroad brush application.

Call them today or write National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

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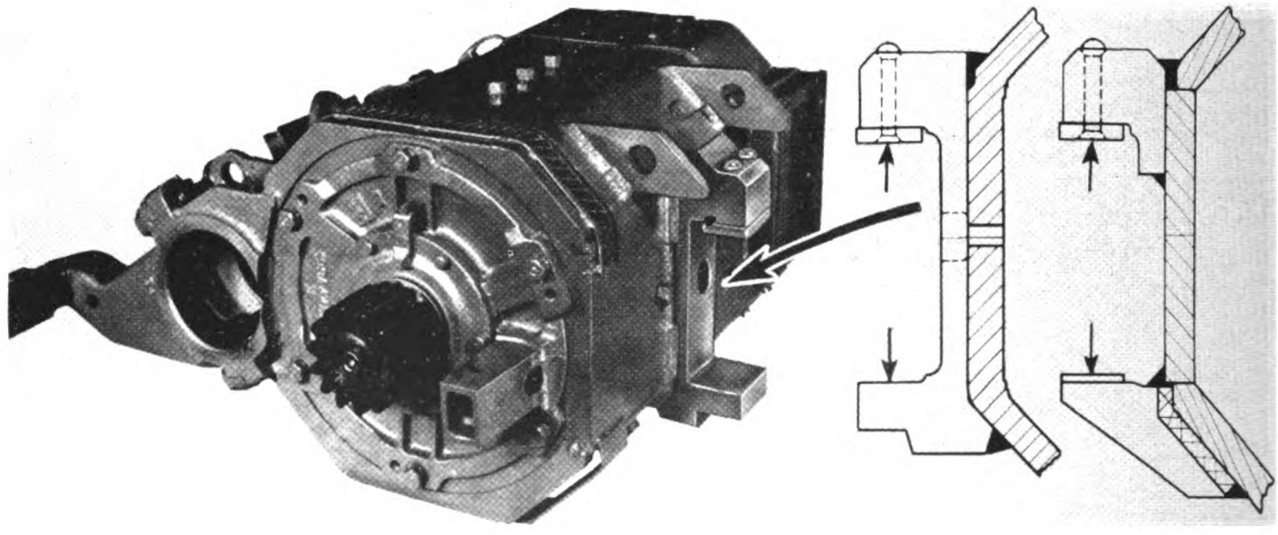


The type 362 motor with original nose design.

The old and new nose design.

Old Locomotives Can Be Made

Better Than When New

When electrical and mechanical parts of diesel locomotives are overhauled they can incorporate improvements made available by the manufacturer

By R. L. Borgardus and T. H. Murphy

SOME 10,000 OR MORE locomotives have now reached a stage in which their equipment should be placed in a condition as good or better than it was when new, so as to successfully operate for the next period of service.

The manufacturers' repair shops have been performing overhaul work on a production basis simultaneously with repair work necessitated through breakdowns. Such repair work has presented the opportunity of studying ways and means of motor and generator improvement. There are improvements now developed that, if included at time of overhaul, will give longer trouble-free life than was contained in the original equipment. Also, new improvements can be developed by the repair shops if the problems or troubles experienced by the railroads with a particular piece of equipment are outlined to them. Close cooperation between the railroad and shop is necessary as all improvements should be thoroughly road tested.

Ordinary procedures permit the repair shop to bring the equipment back to its original design condition. Extreme care must be exercised to avoid unnecessary changes during overhaul that deviate from the original design. However, where weaknesses are noted, every effort should be made after careful study to effect improvement. Experience has proven that any rehabilitation program that does not take advantage of up-to-date mechanical electrical progress to overcome adverse conditions would, in the long run, defeat itself.

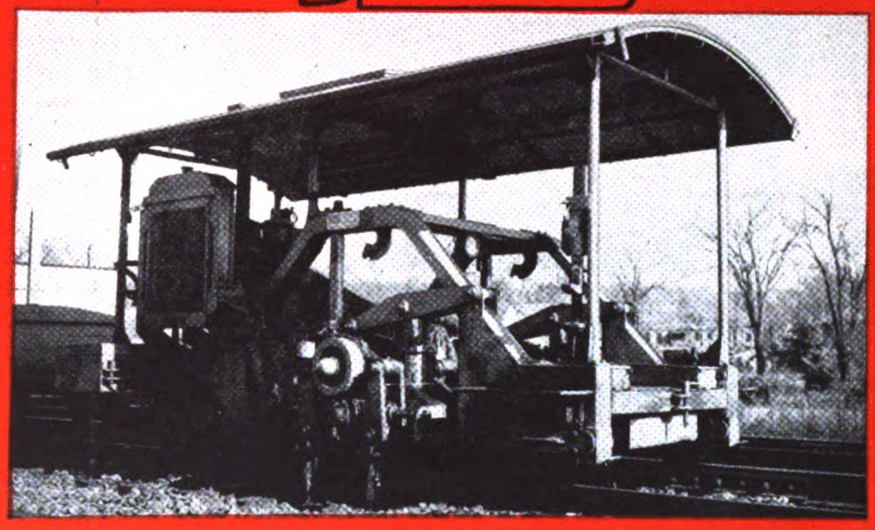
Shop Inspection

The first step in rehabilitating motors and generators should be a

(*continued on page 58*)

This is an abstract of a paper presented at the Summer General Meeting of the American Institute of Electrical Engineers, at Montreal, Que., Can. on July 24-28, 1957. Both authors are with the Westinghouse Electric Corporation, Pittsburgh, Pa.

NEW ESSOLUBE HD KEEPS ENGINES CLEANER LONGER... INCREASES POWER, REDUCES WEAR



New Essolube HD is a superior lubricating oil developed for gasoline and diesel engines of the types used in maintenance-of-way equipment. New Essolube HD contains one of the most effective detergent inhibitor additives ever used. It offers new low-temperature detergency *and* improved high-temperature detergency, plus improved oxidation stability and bearing corrosion resistance.

In extensive laboratory and field tests prior to its introduction, new Essolube HD *proved* its superior detergency properties. Under low-temperature conditions, Essolube HD markedly reduced sludge deposits. Under high-temperature conditions, piston varnish and top ring deposits were reduced to a new low. Such outstanding engine cleanliness results in *greater engine power, reduced wear, longer life.*

NEW ESSOLUBE HD is a versatile oil. You will save on inventory and handling by using it in all your maintenance-of-way equipment – both diesel and gasoline. But most important...there's no danger of using the *wrong* lubricant by mistake.

If you would like more specifics on new Essolube HD, call your local Esso office or write to Esso Standard Oil Company, Railroad Sales Div., 15 West 51st St., New York 19, N. Y.

Esso

RAILROAD PRODUCTS

YOU TOO CAN SAVE MONEY WITH . . .

Lewis sealtite RAILROAD FASTENERS

More than 85 per cent of the nation's No. 1 railroads use Lewis Sealtite products—because the extra features save them money.

•

Each Sealtite bolt and nut is precision designed to do its particular job better. Every Sealtite product is hot forged from uniform special quality steel.

•

All Sealtite products are made in the USA to meet or exceed ASTM specifications.

A FEW OF THE MANY RAILROADS USING SEALTITE PRODUCTS

ILLINOIS CENTRAL

NORTHERN PACIFIC RAILWAY

THE MILWAUKEE ROAD

Santa Fe

CENTRAL OF GEORGIA

GREAT NORTHERN RAILWAY

NEW YORK CENTRAL SYSTEM

OTHER FEATURES THAT SAVE YOU MONEY

FLUSH WITH SURFACE
Sealtite pulls up to a "level with surface" fit without counter sinking.

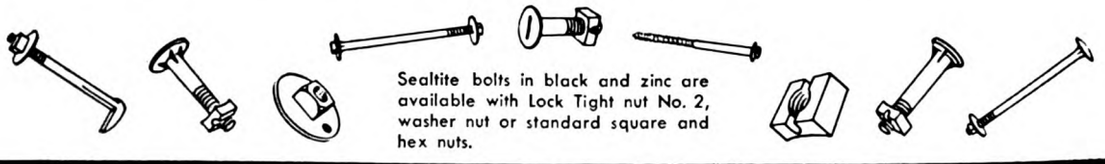
PERFECT FIT
Shank diameter thread to head is exact. No air pockets, no corrosion.

NO SPLINTERS
Sealtite scientific design compresses without raising surface splinters.

PATENTED FINS
For full bearing strength without tearing or splitting wood.

MOISTURE TIGHT
Sealtite tapered, beveled edge forms perfect water tight seal.

ACCURATE THREADING
A spinning fit on each bolt offers easy, fast installation.



Sealtite bolts in black and zinc are available with Lock Tight nut No. 2, washer nut or standard square and hex nuts.

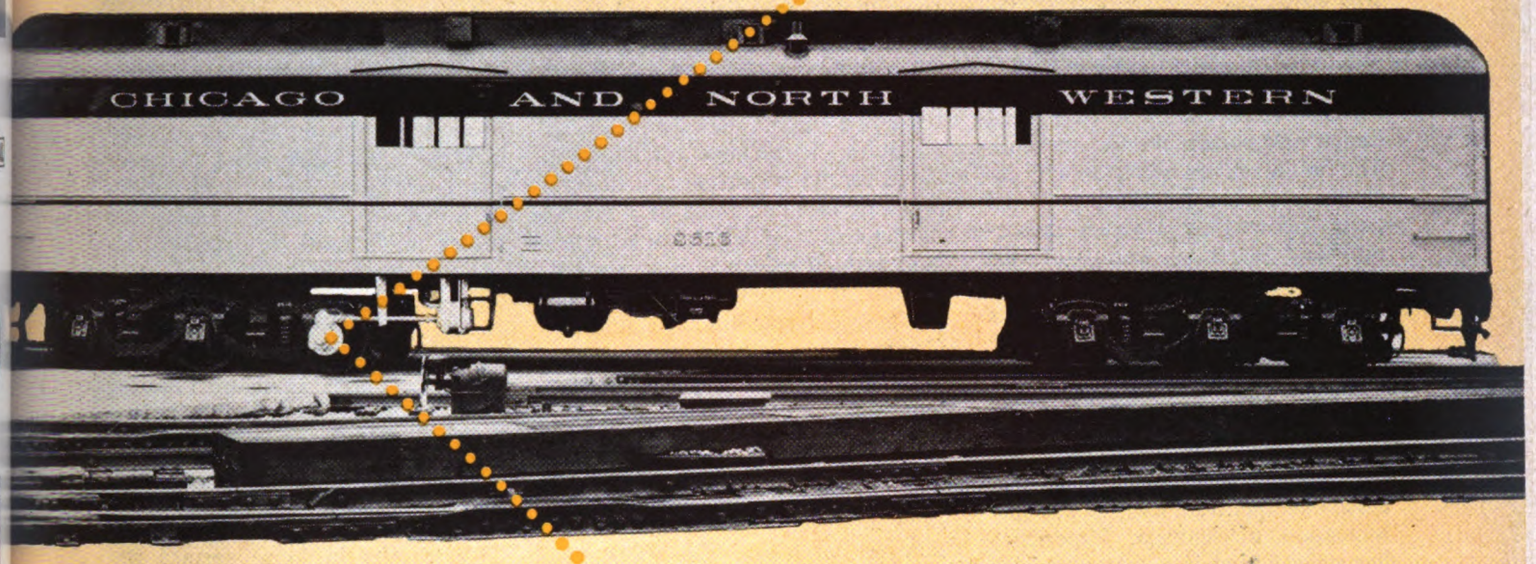
Lewis BOLT & NUT COMPANY
504 Malcolm Avenue S. E. • Minneapolis 14, Minnesota

U QUALITY

Chicago and Northwestern uses the Spicer Model 2½ to 5KW

POSITIVE GENERATOR DRIVE

CHICAGO AND NORTH WESTERN RAILWAY



. . . . the smallest, lightest and lowest-priced positive drive for railway generators!

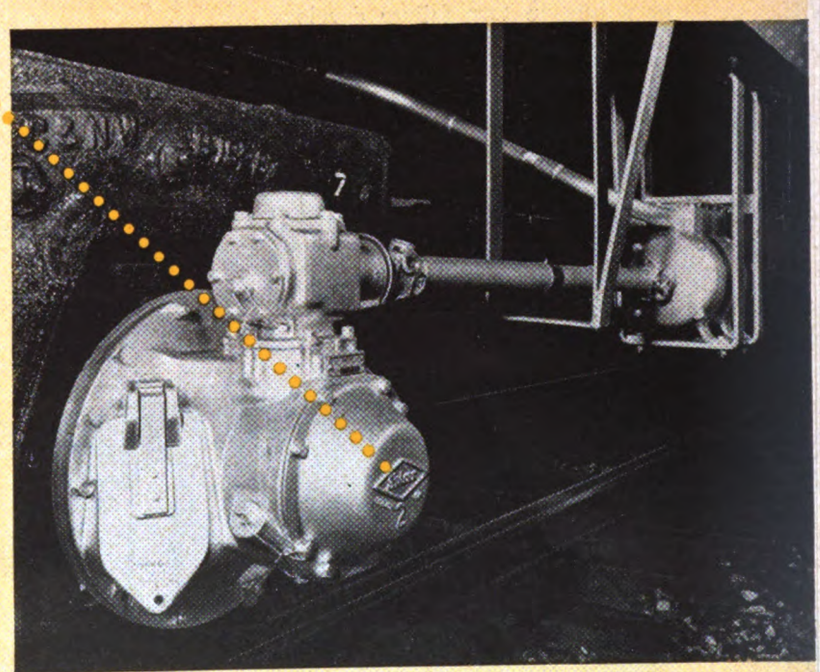
The Model 2 and Model 2-1 Spicer End-of-Axle Drives have been developed for generators up to 5 KW capacity on caboose, cabin, mail, baggage and refrigerator cars.

These drives can be installed either horizontally or vertically, especially meeting the requirements of cabooses and head end cars where minimum maintenance and low operating costs are imperative.

The Model 2 is used on all axles with friction bearings, and on roller bearings where it is not permissable to go through the bearing end cap. It is available for all horizontal and vertical applications in ratios of 1.76 to 1; 2.47 to 1; 3.70 to 1; 5.28 to 1; and 7.55 to 1 (this ratio not available for vertical application).

Model 2-1 is used on roller bearing axles where it is permissable to go through the bearing end cap. It is available in ratios of 1.76 to 1; 2.47 to 1; 3.70 to 1; and 5.28 to 1. Both models are self-contained units employing spiral bevel gears with all wearing parts running in a constant bath of oil.

Ask Dana engineers to help adapt the Spicer Generator Drive to your particular new and old car requirements.



Spicer Generator Drives and Spicer Drives are in use on over 14,000 cars for over 80 railways.

DANA Spicer

DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

complete inspection and test of their mechanical and electrical components. A good inspection will determine not only the parts that have failed and must be replaced, but also those worn parts that will not run to the next overhaul period, or which experience indicates should be replaced. Any wholesale replacement of parts without proof of the necessity of change results in excessive costs.

In testing the equipment, a thorough knowledge of the operating conditions is of importance, together with an understanding of the original design and construction of the unit. The initial examination should include a thorough cleaning of all parts followed by a visual inspection and electrical testing of the several parts. Special studies have been and are being made by various persons and companies of cleaning and testing motors and generators.

Field coil ground insulation should be visually inspected for oil and moisture penetration, progressive aging, mechanical damage, excessive temperature damage and any indication of leakage. Experience has proven that if a ground failure or a turn to turn failure develops in one field of a motor, all fields should be removed and tested. Tests for turn to turn faults are made by impressing a high frequency voltage across coil terminals.

Armature Inspection

Visual inspection of the armature winding to detect charred wedges, loose wedges, armature coil movement at slot edges or coil supports, oil and moisture penetration, progressive aging, mechanical damage, excessive temperature, arcing at points behind commutator or between coil ends should be performed on receipt of the equipment. Careful examination should be made of the commutator end to detect any flaking of mica from the front V ring, flowing of solder at coil and commutator connections, and loose or damaged armature bands. Inspection of the solder on the bands should be made before any electrical testing is considered. All armature inspections should be based on the important fact that an armature winding must be a sound mechanical and electrical component without evidence of movement of coils or bands which would tend to damage insulation mechanically. Commutator rehabilitation is a major item not covered by this paper.

A turn to turn armature test will detect weakness in any of the coils and, of course, a ground test should show up points where the insulation has developed weak spots. The visual inspection is just as important as the electrical inspection, as insulation that is mechanically weak will not give expected service life.

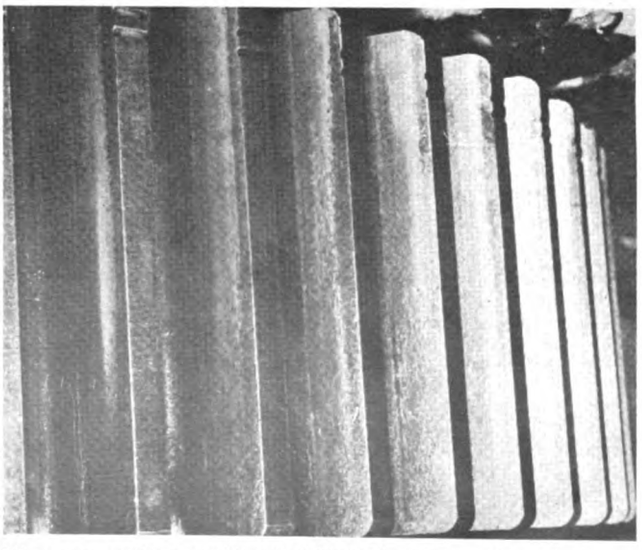
The conventional motor frame has many places where troubles may show up after long mileage. Bearing fits become worn, welds age, fatigue areas develop cracks, and heavily loaded zones break. A frequent case of failure for motors has been the lower nose. Severe stresses are set up when the frame passes over objects between the rails which will actually shear off the lower nose. The same is true when clearance develops in the nose supporting structure, permitting the motor to slap up and down a small amount, such as ¼ in.

New Lower Nose Design

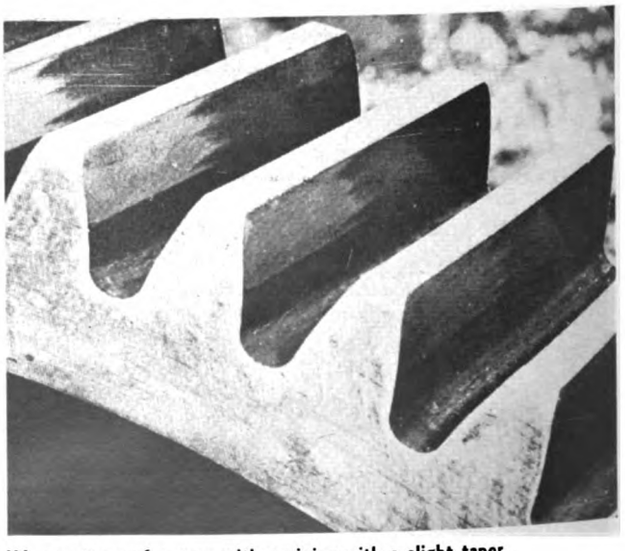
All diesel locomotive traction motors are supported by a conventional spring plank assembly carried by lugs integral with the truck bolster. The motors have an upper and lower nose resting on the top and bottom plank. The steel plates or planks are spaced by coil springs of sufficient strength to carry the motor weight and motor torque reaction forces without going solid. The motors are thus spring supported at their nose support. The nose support must be cushioned, otherwise, nose breakage, bearing failures, frame cracks, and even flashing may result. Actual cases have been noted where a railroad has mixed the several manufacturers' springs in the same assemblies. This results in loose springs and invariably some coils go solid, giving the lower nose a very hard blow. Actual breakage of the lower nose has resulted from incorrect springs.

The same thing occurs if excessive clearance develops anywhere in the assembly. Such clearance may result from wear of the lugs on the truck bolsters, or wearing of the surfaces of the spring planks. Also, wear of the plates on the upper and

(*continued on page 62*)



Wear pattern of a gear with a straight tooth pinion,—note cracks.



Wear pattern of a gear with a pinion with a slight taper.

Question and Answer Session on Carbon Brushes

that says a lot... about QUALITY

Sperry Rail Service, Danbury, Connecticut, designers and operators of Sperry Detector Cars, inspect thousands of miles of rail in track for the nation's foremost railroads. Sperry cars have used Speer Carbon Brushes in their rail current generators since 1935.

Knowing that there must be some good reasons for long use, we asked the Sperry people to tell us why. Here is their answer:

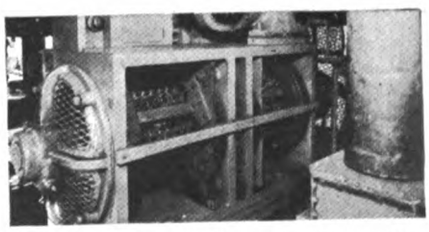
"In our operations it is important that every Detector Car have a dependable source of high-amperage, low-voltage current for testing purposes under a wide range of temperature and atmospheric conditions. Our cars have had to test in temperatures from 40 to 50 below zero to over 100°F. In the hot climates the generating compartments on our cars reach temperatures of approximately 130°F. The Speer #688 Brushes with their long life, excellent electrical characteristics and good cleaning action have given us the highest performance at lowest cost possible. We have tried other makes but have been unable to find brushes which compare with the ones we are using.

"In every Detector Car we use Speer #688 Brushes on both Rail Current Generators. One of these is a Chandeysson H8-43 Homopolar Generator from which we take 9,000 amps. at voltages from approximately 1.5v to 2.2v. This generator uses 192 brushes. The other is a Chandeysson BP17 Double Commutator Generator from which we take from 1,500 to 2,000 amps. from each side – double these figures for total output, also at voltages of from about 1.0v to 2.0v. Eighty brushes are used per unit. On this generator the commutator mica is not undercut but left flush with the commutator surface. This requires a hard brush with good cleaning action such as the Speer 688.

"The Speer Carbon Company representative has maintained close personal contact with us since we started using Speer brushes. To our way of thinking he is the most competent authority on electrical commutation we know."

This is but one railroad customer reaction to one type of Speer carbon brush for railroad use. Speer brushes can do as much for you and there is a type for every kind of railroad application.

Chandeysson BP17-4000 amperes, 2-volt generator uses 64 #688 Speer Brushes



2 Chandeysson H8-43 Homopolar Generators produce 4500 amperes, 2 volts per unit. Each uses 96 #688 Speer Brushes.

Available for the asking is the book, "Brushes by Speer," which describes the complete line of Speer Brushes.

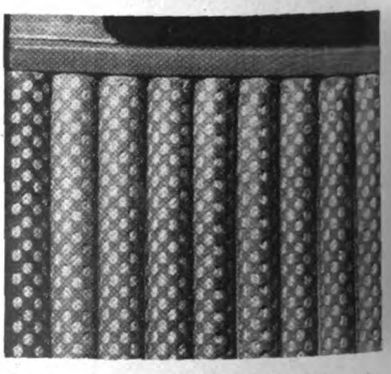
SPEER Carbon Co.
St. Marys, Pa.

EXIDE DEVELOPS NEW, IMPROVED, MORE

Photo courtesy Reading Railroad

New MGD Exide-Ironclad Battery for diesel locomotives. Designed to conform with recommended practices of Association of American Railroads.

ADVANCED TUBULAR CONSTRUCTION— DEVELOPED OUT OF RESEARCH STARTED 15 YEARS AGO



Armored porous tubing. Provides resistance to shedding and effects of vibration, improved flexibility, and maximum retention of active material. Thousands of tiny openings mean . . .

MORE ECONOMICAL DIESEL LOCOMOTIVE BATTERY

New MGD Exide-Ironclad Battery design unlocks more power from battery space—gives you increased savings on investment and operations

Now Exide-Ironclad diesel locomotive batteries are thriftier than they ever were. Always famous for long life and high performance, now they offer improvements that mean even higher capacity per dollar.

Exide has achieved these new benefits for diesel locomotive users by taking full advantage of the extremely high permeability of the armored porous tubing and its improved active material retention characteristics. This highly permeable tubing, made of braided glass fibers within a perforated polyvinyl chloride armor, acts like a highly efficient filter, preventing practically any loss or shedding of active material. Yet the high porosity enhances contact between electrolyte and active material—significantly improving battery performance.

How you benefit

The new MGD battery packs more power per plate than other diesel locomotive batteries. It gives you a 50% increase in amperes discharged at diesel engine cranking rates even over previous model Exide-Ironclad Batteries.

The MGD is available in two sizes: 280 and 420 ampere-hours at the 8-hour discharge rate. In both, concentration of battery power reduces the space required. The MGD-19 (420 ah capacity) battery normally used in large road locomotives is now available within the dimensions of batteries furnished in smaller switching locomotives without sacrifice in cranking, standby performance and life. This means new versatility and the possibility of reducing the number of sizes of batteries needed.

Same Exide-Ironclad quality features

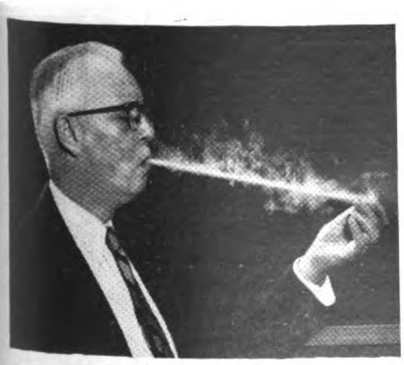
With all these improvements and new battery economies, you still get the quality features that contribute so much to the proven performance of Exide-Ironclad Batteries: heavy copper inserts in terminal posts and cell connectors to insure high sustained voltage during cranking; large electrolyte reservoir above plates to reduce watering requirements; ample sediment space in bottom of jar for long life; rugged molded rubber container built to withstand locomotive operation and provide for reduced maintenance.

Discover how much you can save

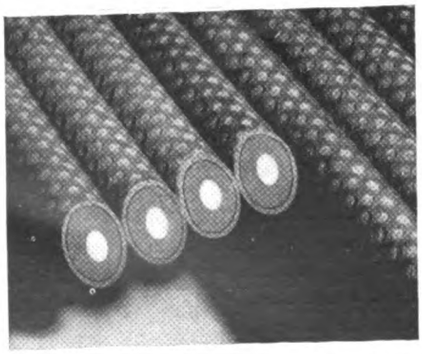
Learn how much you can benefit from the advantages this battery offers. Call your nearby Exide representative. Or write for complete information. Dept. MG, Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

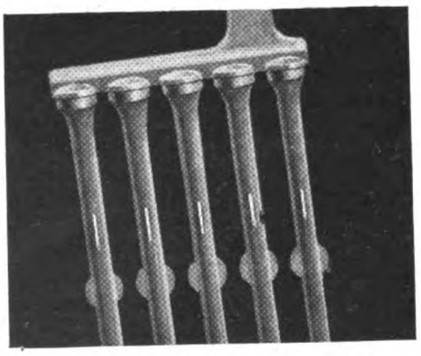
THE ELECTRIC STORAGE BATTERY COMPANY



Greater porosity. Highly permeable tubes ease current flow, reduce internal resistance, improve access of electrolyte for superior performance under heavy loads. Each plate delivers more power. Tubes hold . . .

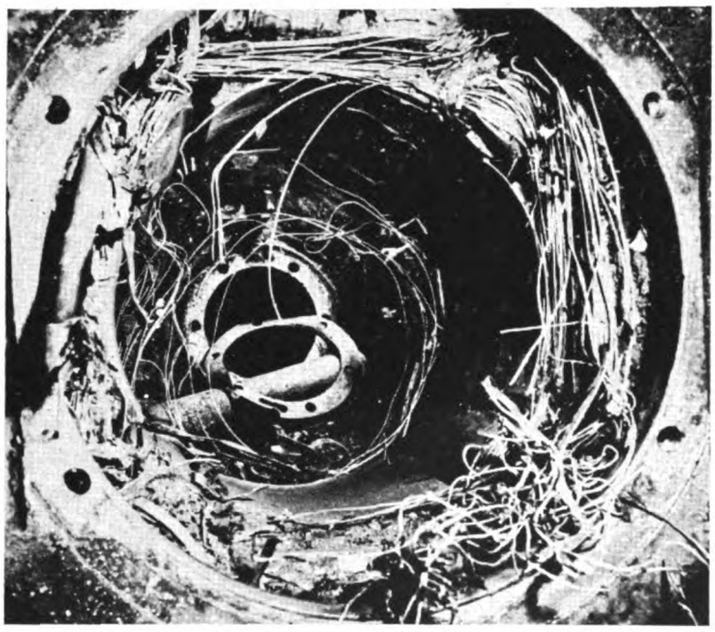


More active material. Chief source of battery power. Larger inside diameter of tubes means every positive plate contains more active material per cubic inch of plate. You get all this . . .

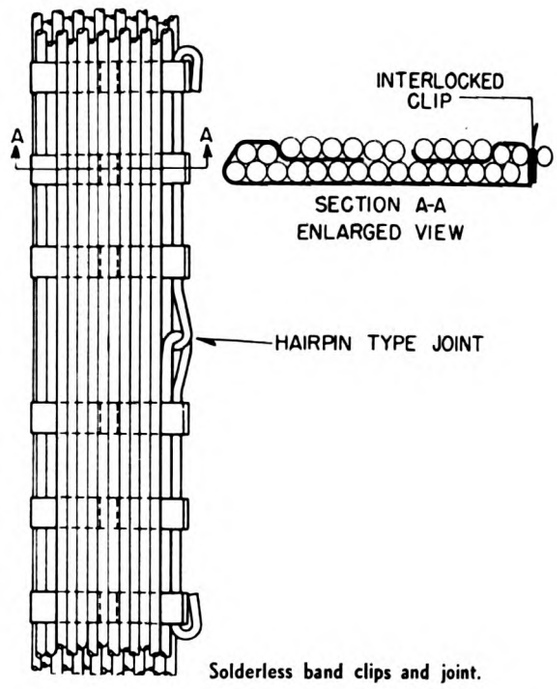


Plus Silvium,* Exide's patented grid alloy—proved more corrosion resistant than any other grid alloy. Tests prove conclusively that Silvium prolongs battery life.

**U.S. Patent*



Wrecked motor with band failure.



Solderless band clips and joint.

lower nose increases the clearance. Overhaul of the motor in the shop must include bringing the dimensions between the upper and lower nose to the original tolerance.

Experience has shown that the original 362 lower motor nose design was more prone to break than others. A redesign was made and thoroughly tested. Tests were set up by clamping the motor frame to a bedplate and then dropping a heavy weight a specified distance against the lower nose. The new design outlasted the clamping bolts in the tests. Field tests later proved the new design far superior to the old as stress concentration was reduced. The design was made stronger in several ways. There is more material in the throat of the support due to method of welding. The failures usually occur in the throat so additional material across the throat aids considerably. Also, a support much the same as a web acting as a heel was added to the design. The repair shops can add the design to any 362 motors.

Another feature developed through experience is arcing horns. These provide a minimum gap to ground at a point where burning will do the least damage in case of a flashover. They can be added to Westinghouse motors and generators by the repair shops.

Careful examination of the bearings will usually bring out defects where replacements are necessary. Good lighting and visual magnification are necessary for such inspections. Even new bearings must be carefully handled to avoid acid staining of the hands or contaminating of the grease. Special facilities and instructions are necessary for proper handling of roller and ball bearings in railway machines.

Use of New Taper Pinions

Many gears in use on traction motors develop characteristic fatigue cracks at the root of the tooth. These are on the inboard end of the gear which is the most heavily loaded zone. Field examination of many cracked gears showed a uniform wear pattern with point of contact commencing at the inboard end and extending 10 to 30 per cent across the tooth. Contact between the pinion and gear was being made over only a small area. There was a slight difference in wear pattern on the two sides of the tooth. The poor wear pattern resulted from such things as motor shaft deflections, motor axle bearing clearance and deflections of the gear or pinion teeth.

Hand fitting was not practical, but obviously tapering the tooth would give a better contact condition. It was decided to taper only the pinion teeth for ease of cutting and as a minimum of teeth would have to be so ground. As field experience had shown a different wear pattern on the two sides, a special taper was adapted for each side of the pinion tooth. The first tapers tried were approximately 0.003 total across one face, and 0.006 on the other.

Field experience showed great improvement in the wear pattern, but not all that was desired. We observed many gears and pinions shortly after they were placed in service to note wear pattern with various tapers. The final taper adopted gave almost 100 per cent contact across the whole tooth on each side. Breakages or cracked teeth decreased to almost nothing with the new pinions. All motors should have the new pinions applied during overhaul even if the old pinions without taper are in satisfactory condition. The improvement comes in longer life for the gears and freedom from cracks.

Steel Banding Improvements and Glass Banding

Two major advances have been developed in recent years in the banding of traction equipment. The first was the application of solderless steel bands. This was a major step in overcoming trouble as melting of solder on bands due to eddy currents or high temperature air on the face of the armature due to lack of proper cooling air has been a major source of failure. Since solder running is the usual initial cause of failure, the first improvements dealt with the elimination of solder in

(*continued on page 64*)

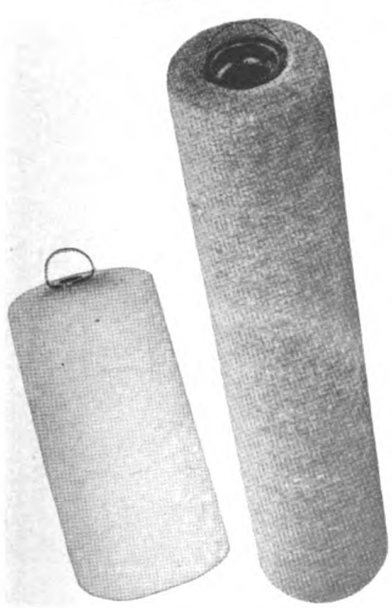
BIG, BURLY, BEAUTIFUL ...and oh, so *Vulnerable!*

Any care less than the very best, for Railroad Diesels, just doesn't make sense! Despite its size and cost your Diesel engine is exactly as susceptible to the ravages of dust, dirt, grit and other contaminants as the cheapest car engine.

Compare the care the motorist gives his $2000 car with that given a $2,000,000 Diesel locomotive! Today's car engine has the protection of a lubricating oil filter, a gasoline filter and an air filter... all with a high degree of engineering back of them.

On the other hand, there are still some railroads that are packing cans with waste to filter Diesel lubricating oil. Of course, the majority have a more enlightened appreciation of the menace of dust and dirt. Many employ WIX Engineered Filtration as standard practice.

WIX has invested thousands of man hours in research... the engineering has been done... the facts are here for your engineers to read. WIX is ready with proven filtering media for both fuel and lube oils, plus years of Railroad filtration "know-how". Write for full information today.



LUBE wix® FUEL

RAILROAD OIL FILTERS

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holding the clips and fastening of the steel wire end.

The so-called hair pin lock at the wire end eliminated all necessity of soldering the wire. Also, overlapping the strips or clips securely held them in place without the use of solder so that in a final steel band design, solder was unnecessary. The repair shops can apply this modern type of steel band to any armatures.

As everyone knows, the steel armature bands contribute to the severity of a failure when they are burned loose. The banding wires scattered inside of motors after some failures are often referred to as a "Rat's Nest." Also, the steel banding wire has rubbed through insulation causing grounds and costly repairs. No matter what troubles they produce, banding is necessary to hold the coils rigidly against throw-out at high speeds.

Polyester Banding

A second major development to overcome the past failures of the steel banding has been polyester glass banding. The replacement of stainless steel bands with an equally strong, non-magnetic, insulating band has some obvious advantages which are rapidly being recognized. It is evident that the glass polyester in this application must be capable of withstanding the same stresses and must perform the same functions as the steel bands. In order to accomplish this end result, the glass polyester band must be applied under similar tension as the steel so that it will duplicate the conditions specified in steel banding.

Glass polyester bands consist of a Fiberglas non-woven parallel glass yarn tape impregnated and bonded with a thermosetting polyester. The tape is laid up unilaterally without any cross weave. A longitudinally woven tape is used which is held together weakly by the semi-cured polyester during application. The tape exhibits a remarkable strength in the direction as it has no cross weave to shear or break the longitudinal threads under tension. The tape is applied to the armature under tension. The polyester is completely cured during the baking cycle thus binding the matrix into a homogeneous mass.

Glass polyester tape can be applied under the same tension as steel. It is recommended that the physical dimensions of the band when compared with steel be increased 50 per cent.

Field Coil

In rehabilitating field coils for traction service, the following adverse conditions must be considered: atmospheric contamination by diesel oil, brush carbon, chemical laden dirt picked up from the road bed, and chemical acids induced into the motor during the cleaning of the locomotive, and in addition extreme humidity and temperatures.

The type of insulation selected where rewind is necessary and the method of co-ordinating the various varnish and compounds used to seal the coil must result in a combination that will give high mechanical strength, good abrasive resistance, tear strength, elasticity, compressive strength, moisture and oil resistance. In addition, they must lend to encapsulation or mummification processes to give a complete sealing of coils against the entrance of oil and dirt.

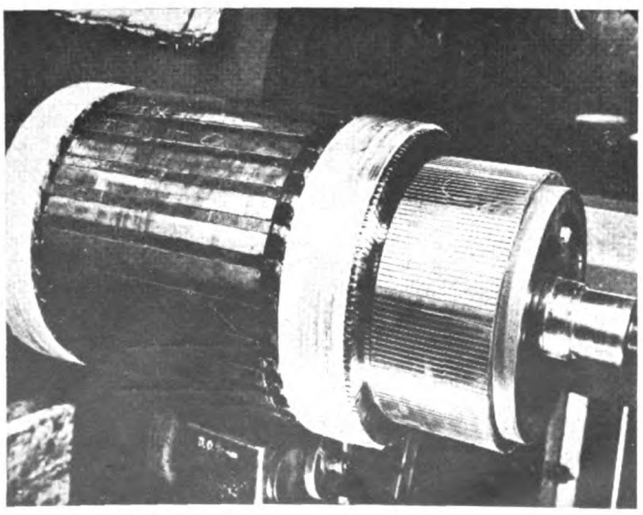
After two years of intensive development and test, coils are now available with a new insulation arrangement that will meet all of these conditions. The actual insulation would be silicone bonded asbestos between turns followed by a blocking and heat pressing to proper size and shape, taping all coil leads with silicone mica tape, ground insulation of silicone bonded glass and mica tape, and a finish tape of untreated glass to provide a foundation for final treatment of the insulated coils consisting of vacuum and pressure impregnation of a filled epoxy resin. The baking cycle is recommended to be 8 to 12 hours at 150 deg C.

Potting the coils integral with the poles is a further improvement. This fills the voids between pole and coil preventing the accumulation of dirt and oil in such pockets, and improves the conduction of heat from the coils to the poles and frame of the motor. Potting can be done during impregnation or it can be done by mounting the coil on the pole piece and filling all open voids between coil and iron with epoxy potting compound.

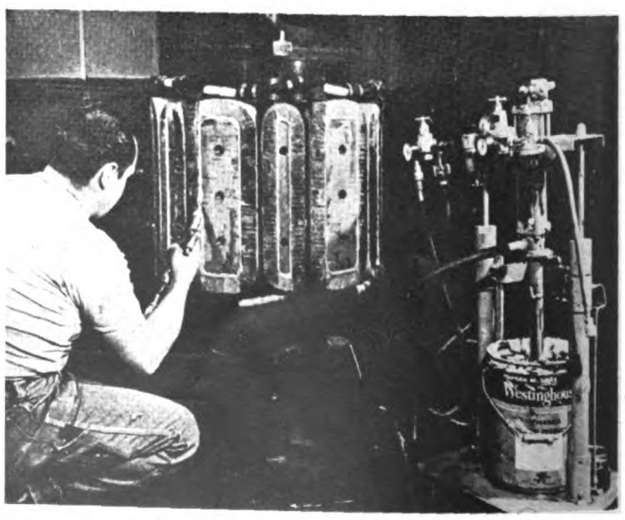
Armature Coils and Assembly

NEMA Class HHB-V armature coil insulation meets the requirements of traction service. Experi-

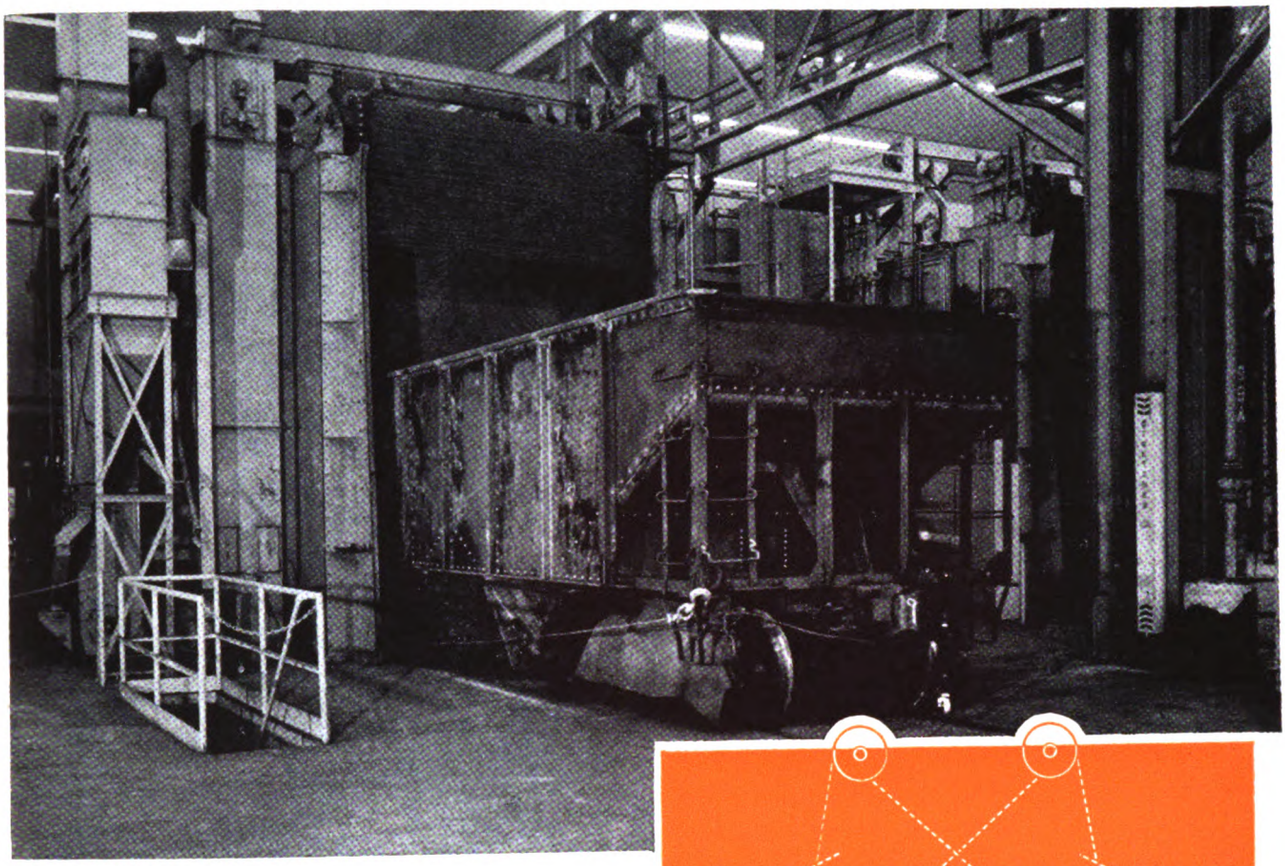
(*continued on page 70b*)



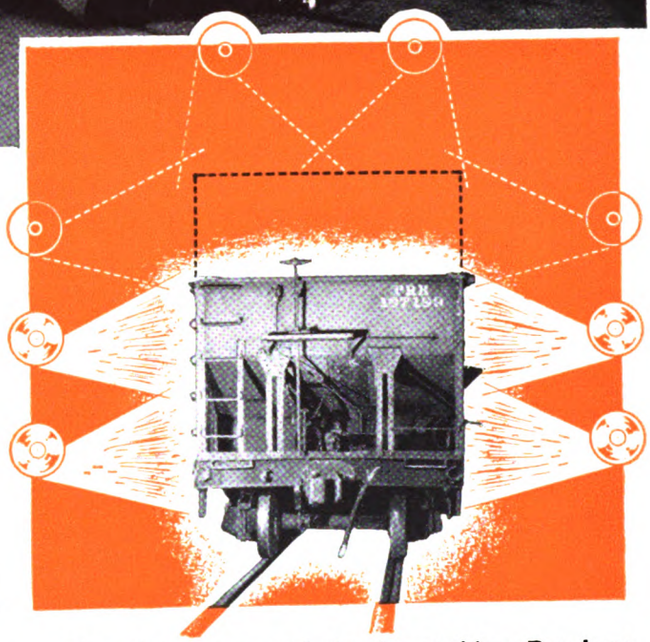
Armature with glass band.



Field coils potted on poles.



AUTOMATIC Pangborn Rotoblast cuts freight car cleaning time 85%!

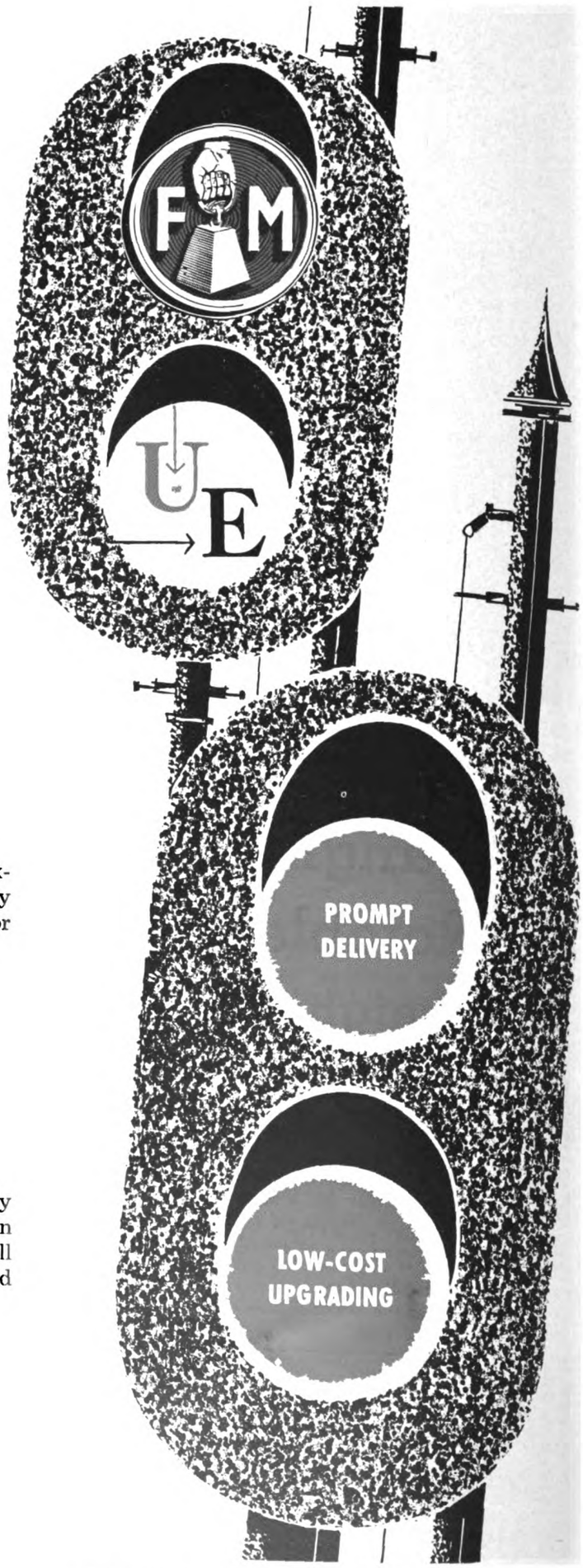


In the Pennsylvania RR's Samuel Rea Shop, Hollidaysburg, Pa., hopper cars and boxcars are Rotoblasted before painting and stenciling. With the equipment previously used for this job, five men each spent an average of 2.7 hours cleaning a typical 42-ft. hopper car. Today, using special Pangborn Rotoblast Rooms for the same job, the railroad has cut labor to *four* men per unit—and they *turn out four cars every hour!* In addition to cutting man-hours 85%, the quality of cleaning is far better than before.

If you have an unusual cleaning problem, Pangborn offers a special service. Pangborn engineers will study your problem and its relation to your production line. Then they will design a Rotoblasting machine for your particular needs. Find out now how Pangborn's engineering service can give you better cleaning and faster production at lower cost.

Write today for Bulletin 1210A to PANGBORN CORP., 3700 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn ROTOBLAST® cleans cheaper

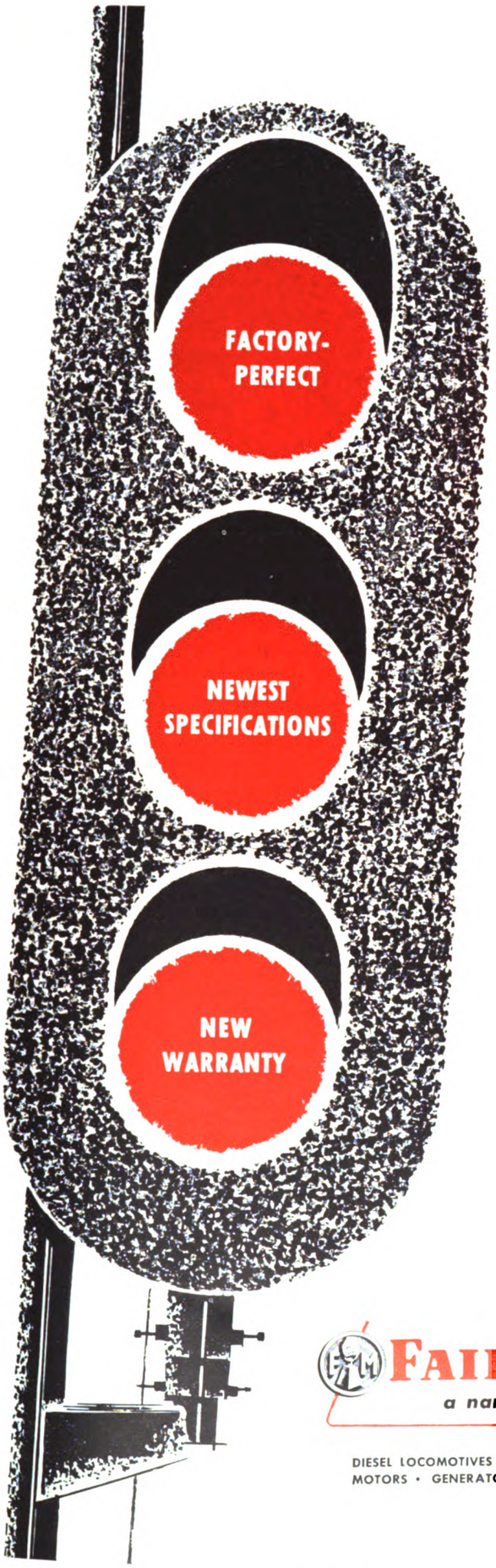


UNIT EXCHANGE

The only engine better than the O-P you have is an Opposed-Piston diesel made better by Fairbanks-Morse — available NOW through F-M Unit Exchange.

Due to a 60% increase in the F-M Unit Exchange program, there are O-P engines of every rating and major accessory group ready for prompt shipment on your order.

This F-M program enables you to effectively meet increased tonnage demands being made on your motive power fleet, yet reduces costs all along the line—lower maintenance, reduced shop facilities and lower parts inventory.



The only engine better than the O-P you now have is one "made better" by F-M craftsmen, who have the skill and techniques acquired through daily experience with only *one* engine design.

F-M's continual search for better engine performance and life can substantially improve the O-P engine and its components of five to ten years ago in many respects. Unit Exchange equipment meets the newest specifications.

Each engine, blower, pump, injection system, generator and traction motor in the F-M Unit Exchange program is warranted to give the same performance as new equipment.

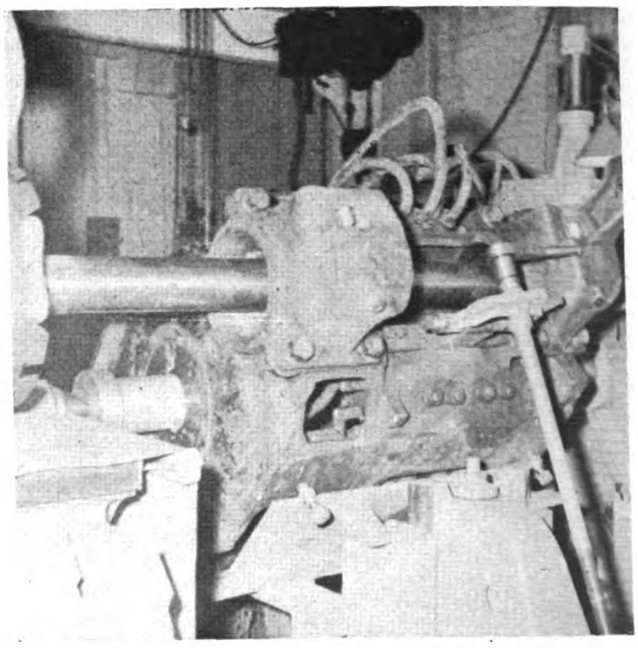
For full details and delivery schedules, write: Diesel Locomotive Service Department, Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES **AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC** MOTORS • GENERATORS **• PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS**

SP&S Quartering Machine Bores Motor Support Bearings



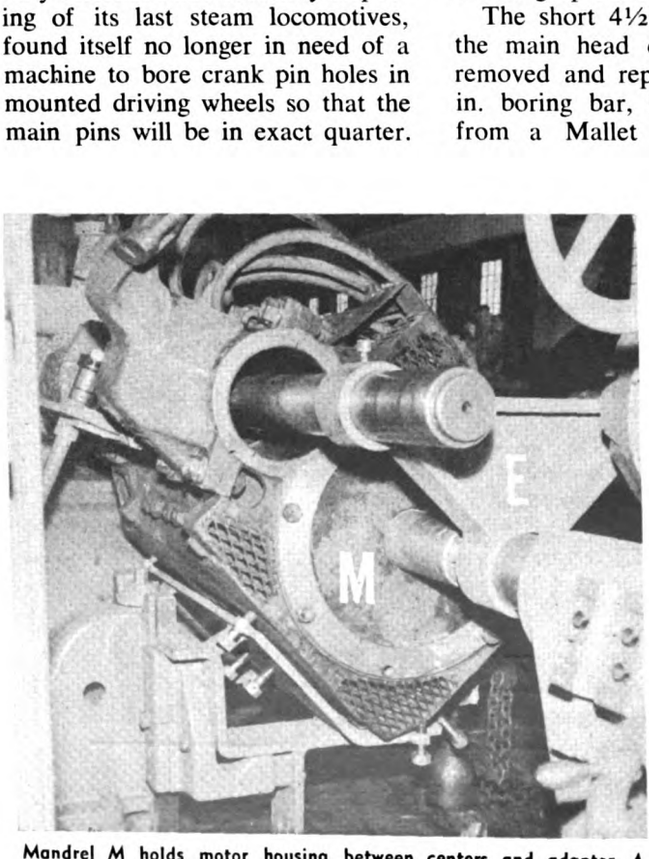
EMD traction motor support bearings being bored on Niles quartering machine.

A Niles quartering machine, adapted for boring either EMD or Alco-GE diesel locomotive motor support bearings is one of the newest developments at the Vancouver, Wash., shop of the Spokane, Portland & Seattle. This railroad, now fully dieselized and currently disposing of its last steam locomotives, found itself no longer in need of a machine to bore crank pin holes in mounted driving wheels so that the main pins will be in exact quarter.

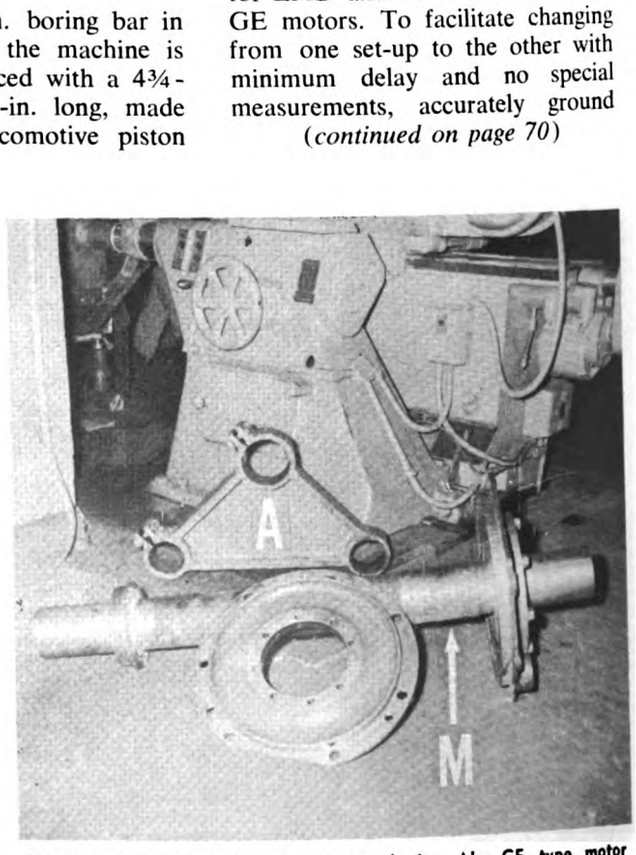
By constructing an adapter and mandrel, and making certain other changes in the machine, it is now successfully used for boring motor support bearings quickly and accurately at a single setting of the motor housing and without even an indexing operation.

The short 4½-in. boring bar in the main head of the machine is removed and replaced with a 4¾-in. boring bar, 91-in. long, made from a Mallet locomotive piston rod and equipped with a cutting tool having micrometer adjustment. The machine centers are adjusted to the same distance from the boring bar center line as the standard armature and motor support bearing center spacing. This is 17.111 in. for EMD and 18.444 in. for Alco-GE motors. To facilitate changing from one set-up to the other with minimum delay and no special measurements, accurately ground

(*continued on page 70*)

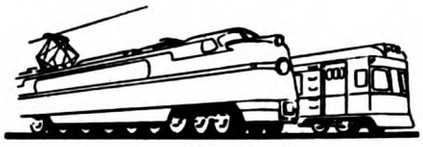


Mandrel M holds motor housing between centers and adapter A forms outboard support for boring bar.



Mandrel M and adapter A used in boring Alco-GE type motor support bearings.

DIESELS



ELECTRICS

MU CARS

ALL can have EXTRA, TROUBLE-FREE MILEAGE with Magnus traction motor support bearings

EVERY make and model of diesel-electric and electric locomotives or MU cars ever built can take advantage of the extra precision and trouble-free performance of genuine Magnus HIGH MILEAGE traction motor support bearings. These super-precision replacement bearings, designed and built by bearing specialists, can be obtained by any Railroad directly from Magnus Metal Corporation.

Each of the features at the right makes an important contribution to that extra safety factor found only in Magnus traction motor support bearings. And the present-day trend to higher mileage between motor overhauls call for this added cushion against costly breakdowns.

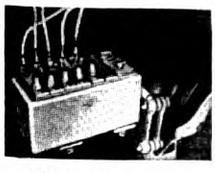
What's more, Magnus high-speed, high-precision production methods can manufacture these bearings so economically that relining or rebuilding is both unnecessary and impractical.

For the complete story on Magnus HIGH-MILEAGE traction motor support bearings, write for your free copy of Bulletin No. 6000, Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Blvd., Chicago 6, Ill.

FEATURES

1. Perfectly mated bearing halves
2. Heat-resistant Satco lining metal
3. Interchangeable double keeway
4. High strength brass backs
5. Improved flange fillet profile — no "feathering," no "riding."
6. Precision finish boring to extremely close tolerances.

OTHER MAGNUS PRODUCTS FOR DIESEL LOCOMOTIVES



Wheel Flange Lubricators

Safety Valves

Fuel Tank Sight Gages

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

spacing blocks have been made for insertion on inclined ways under the machine heads. These automatically bring the centers to the desired spacings.

The adapter, fabricated locally by welding and machined with a high degree of accuracy, has one bearing on the right center bar of the quartering machine, and one on the original short boring bar which is left in that side of the machine. It is, in effect, an outboard support for the new long boring bar. Obviously, adapters identical in design but differing slightly in center distances are required for EMD and Alco-GE motor housings. The one shown in the machine in one of the views is for EMD and the one on the floor in another view is for Alco-GE. Referring to the latter, it will be noted that two of the circular bearings are split for firm clamping around the machine center and boring bars. The third circular bearing is a close running fit on the long boring bar.

Two similar mandrels are also required, the one shown disassembled on the floor being Alco-GE. It consists of a center bar designed to fit between machine centers, having a fixed center plate on one end for application and bolting to the stator bore and a loose center plate which is slipped over the center bar and bolted to the other end of the stator bore.

Necessary changes were also made in the central work support bracket, originally designed to hold locomotive driving wheels and now enlarged and adapted to support traction motor housings. Means for attaching the upper end of the 2-in. tie bar to the motor housing are also provided so the housing may be revolved slightly in either direction about armature centers, as required when centering the boring bar in the motor support bearing hole.

In operation, the motor housing, with mandrel in place, is set on the central bearing bracket and raised slightly until the bar lines up with machine centers which are then secured in place. Adjusting screws in the central bracket are tightened up against the housing to give full support. Bearing caps are applied over the boring bar, the bore centered by use of tie-bar and both bearing surfaces trued in perfect alinement with each other and accurate within .001 in., or less.

The motor housing shown in the machine is an EMD type and this motor was shopped because of a bearing cap which ruptured when it contacted a rock that rolled between the rails. This bearing cap was repaired by welding which pulled the bearing slightly out of line so it had to be trued by removing .005-in. of excess metal from part of the bore.

In general, the bearing caps of all traction motors repaired at this shop are built up by electric welding, as required, and rebored. The manufacturers' tolerances for motor support bearing size are as follows: EMD—9.249 in. to 9.257 in.; Alco-GE—10.500 in. to 10.504 in. With the revised quartering machine arrangement, the SP & S finds it easy to keep within these limits.

From the Diesel Maintainer's Note Book

Grounded by a Door Latch

By Gordon Taylor

A FOUR-UNIT E.M.D. freight diesel locomotive was going about its business with everything working properly, when suddenly a ground relay action occurred in the lead unit. The fireman reset the ground relay, but almost immediately, it opened again. Once again the fireman reset the relay with the same result.

The fireman then wisely decided to isolate the unit, since it could not be operated with continuous ground relay action.

Since the trouble was on the lead unit, the crew decided to save the battery by allowing the engine to operate in idle position, and thus obtain some benefit of the auxiliary generator. Had there been engine trouble, the engine could not have been continued in service; but in this case, it was proper to idle it to conserve the battery.

The locomotive being in level territory, handled its train to an intermediate terminal. At that point, it was necessary to reduce tonnage to three-unit capacity due to fact that the train was moving into heavy grades. The train continued on its way to the next maintenance terminal where the defective unit was inspected.

When inspection was made, it was found there was no evidence of a flashover at either the main generator or at the traction motors. This indicated that trouble was a grounded condition in the high voltage power circuits. This called for an inspection of various power cabinets.

When the door in front of the reverser was opened, a door latch which was lodged between the reverser and the door, fell to the floor and the ground was cleared.

In the compartment just above the reverser compartment is a double door with two locks. One lock is near the top of the door, and the other near the bottom. These locks are welded to the inside of the steel plate door. The top lock had broken loose where it was welded, and had fallen into the compartment below where it lodged between the reverser and the reverser door in a manner that caused a ground in the high voltage circuit.

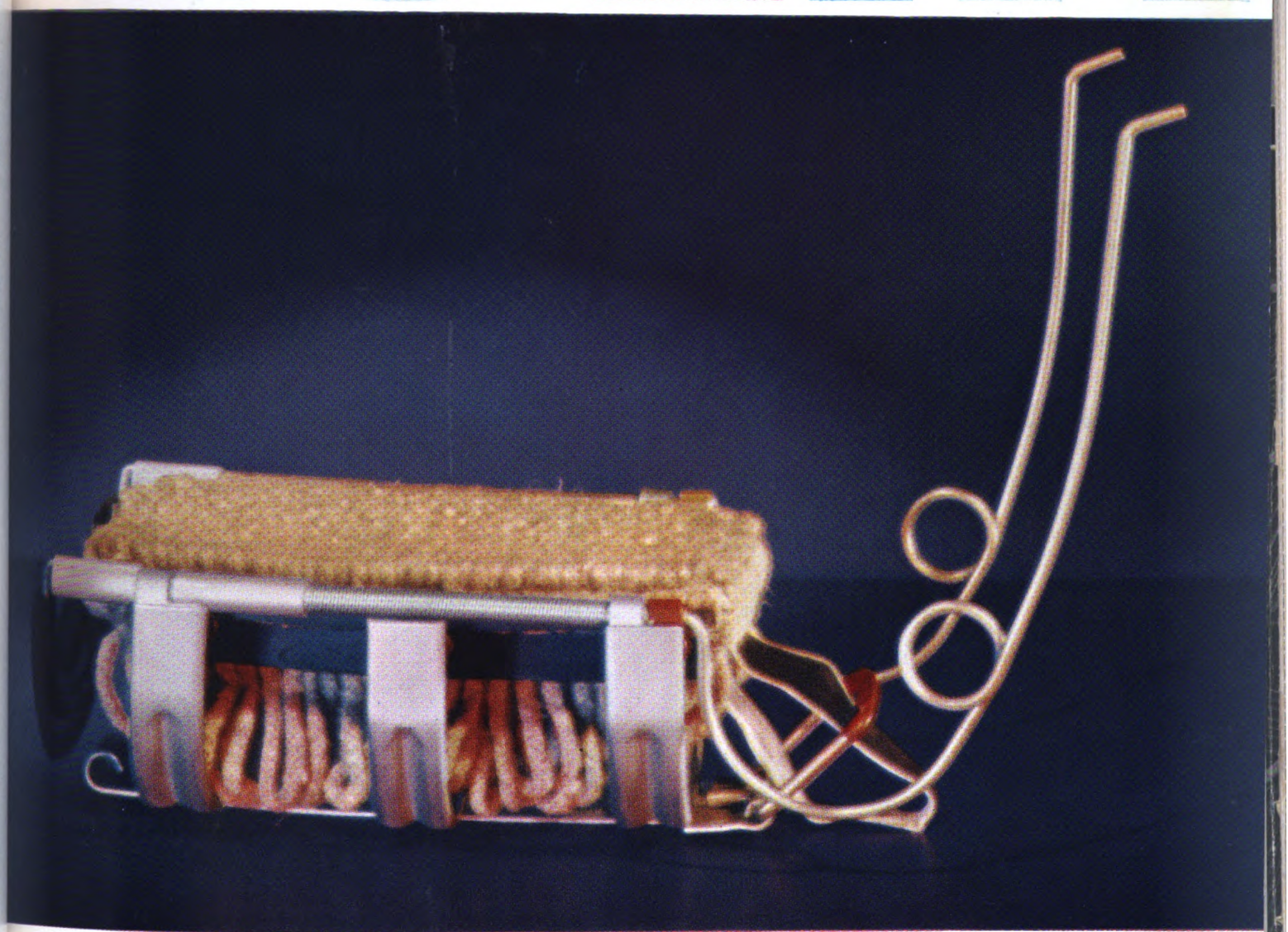
The only repair needed was to have the boilermaker weld the lock back in place.

Very likely some maintainer had noticed that the door lock was starting to break loose, but did not attach much importance to it. He probably did not see how a loose door lock could possibly cause trouble, but there is simply nothing about a diesel that can be neglected if it is to give first-class service.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

ROLIN



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

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HOW MUCH DO YOU KNOW ABOUT BRUSHES?

Should Brush Grades Be Mixed on a Commutator?

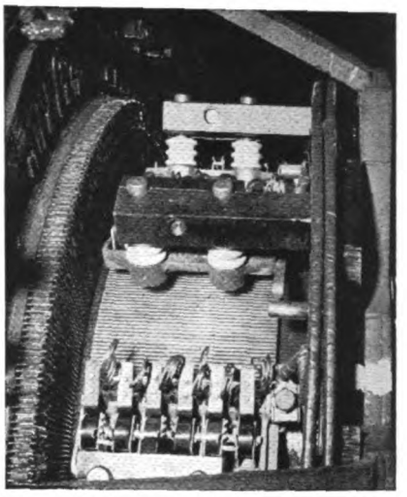
IN GENERAL, IT IS MISGUIDED operating practice to mix brush grades. Very few brush grades contain the same film forming properties and therefore, mixed brushes may not lay down similar films on a commutator. This is true even for different grades produced within a given company. The films from two given brush grades in the same wear track may be, and usually are, incompatible to the extent that the brush friction characteristics are changed. In the event the friction is increased, brush chatter, breakage, and film stripping may occur.

Mixing grades can also result in a cumulative filming effect on the commutator. This effect may lead to smutting of commutator bars and eventually bar burning.

Differences in contact drop between brush grades can also cause selective action of current flow through the brushes in a given holder.

There are processing circumstances known only to the manufacturer of the brushes involved which may justify an agreement that two of the same producer's grades can be mixed on a commutator without any serious sacrifice in performance. However, this may only be recommended as a temporary expedient to enable the user to work off an inventory of an obsoleted brush grade. Mixtures of competitive grades can only be justified by tests. Usually be the time tests are completed, the need for them is gone.

One other condition may warrant the use of a different type of brush grade in conjunction with the standard commutating grade. This condition arises when contaminants in the atmosphere indicate a cleaner or gentle scouring action brush is necessary to prevent excessive filming of the commutator. The filming properties of cleaner brushes are usually negligible. They are seldom specified as a standard grade for a machine and are used primarily for industrial applications.



By K. R. MATZ
National Carbon Company

This is the eighth of a series of questions and answers which are appearing each month.

Old Locomotives Can Be Made Better Than When New

(*continued from page 64*)

ence indicates silicone bonded glass-backed mica tape applied continuously from turn end to turn end, ground insulation of silicone bonded glass-backed mica tape applied continuously in multiple layers completely around the whole coil followed by a cold and hot pressing results in a coil that will give long life in traction service.

Vacuum and pressure impregnation of the coil, plus vacuum and pressure impregnation of the completed armature are a requisite to meet the mechanical and centrifugal forces present in a traction application.

The selection of the correct impregnating varnish to meet service requirements is most important. The varnish should have high bonding strength, good adhesion, durability, moisture and oil resistance, and high thermal stability. We have found the thermosetting type to give the best results, but the impregnating and baking cycle is most important regardless of the type.

Two outstanding points should be observed in rehabilitating traction armatures: (1) The armature must be clean and dry with a high megger reading before varnish treatment is applied. Varnish will not give a complete bond over dirt and failure is likely to occur as soon as thermal expansion cracks the varnish film. (2) The second important point in rehabilitating armatures is to note that high temperature solder must be used in making all connections. Residual solder must be removed as mixing of solders results in a lowering of the solder melting point to a dangerously low temperature.

Insulating materials and design features of electrical apparatus are much greatly improved over those in use 10 to 15 years ago when diesel locomotive equipment was first produced in quantity. Repair shops usually duplicate original design, but this is not true for diesel motors and generators as repair design improvements have kept pace with modern practices. Encapsulated field coils, new insulation for armature coils, bands of glass material, and other features are now available for diesel motors and generators. These improvements will give longer trouble-free life than contained in the original design and the railroads stand to gain considerably in dollars through their use.

Put your Wyandotte cleaning specialist to work ...anywhere

(his service is systemwide!)

Got a cleaning problem? Take it to an expert. That's the sure way to get things done right!

And if your problem involves railroad-cleaning costs, the man to see is your Wyandotte railroad-cleaning specialist. Here's why:

FULL-TIME CLEANING SPECIALIST

Your Wyandotte specialist in railroad cleaning makes a career out of solving problems such as yours. Through years of experience, he has amassed a tremendous store of practical knowledge about cleaning products, methods, and procedures . . . both on an individual-shop basis and on a systemwide basis.

SYSTEMWIDE SERVICE AVAILABLE

Your Wyandotte specialist is assigned permanently to your line. This means he devotes his time to improving cleaning on your road. He's not restricted to any local area, and can provide service on a systemwide basis—thus co-ordinating his activities with your requirements for mechanical, purchasing, and test departments. He can help you eliminate overlapping inventories, too!

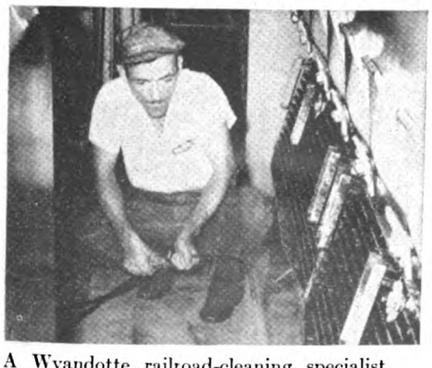
Think of the convenience! You turn all cleaning problems over to one man—a man with the time and know-how to solve them.

Why not take full advantage of this service? We're proud of what we have done for other railroads . . . we would like to work with and help you, too. Get more details by writing us, today! *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

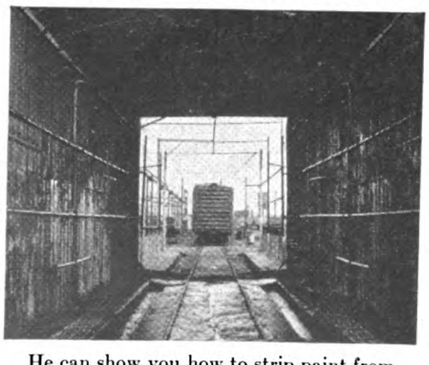
Wyandotte
CHEMICALS
J. B. FORD DIVISION

COMPLETE LINE OF CLEANERS FOR ALL RAILWAY NEEDS

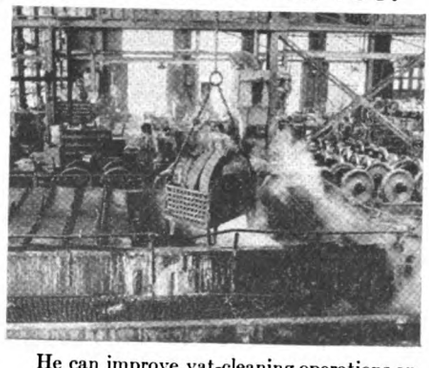
SOME OF THE THINGS A WYANDOTTE RAILROAD-CLEANING SPECIALIST CAN DO FOR YOU!



A Wyandotte railroad-cleaning specialist can help you clean the inside of a diesel or locomotive for less than $1.50 - and save one third of the labor cost!



He can show you how to strip paint from a box car, rinse and phosphatize it, for about $5.00—and do the complete job within five to nine minutes!



He can improve vat-cleaning operations on the toughest jobs—diesel trucks, wheels, engine parts—increase cleaning efficiency, lower cost to as little as 2½¢ per ton!

Land Transportation Committee, American Institute of Electrical Engineers in session at its October 9, 1957 meeting in Chicago.

Things to Come . . . . .

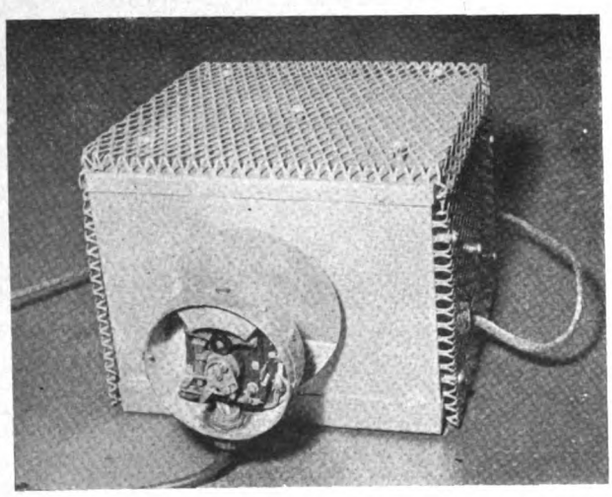
PLANNING FOR FUTURE railroad needs, the Land Transportation Committee of the American Institute of Electrical Engineers will present papers on computers as a means of determining train performance and equipment design at the AIEE Winter General Meeting to be held in New York, February 2–7, 1958.

Another contribution to be offered at this time will be a simple chart by means of which any railroad may closely approximate the financial return which might be made by any railroad by electrifying any part or all of its lines.

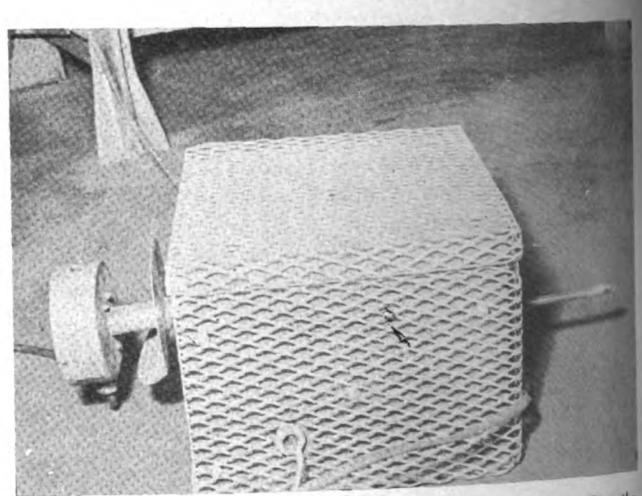
Others will outline railway dieselization trends in North and South America, a static control system for gas turbine locomotives, and nondestructive evaluation of insulation.

At a joint meeting with the Railroad Division of the American Society of Mechanical Engineers to be held in Cleveland, Ohio, April 9-10, 1958, the result of studies concerned with dollar value of damage done to diesels by dirt will be given. Up-to-date information on wheelslip protection will also be presented.

Also in process of study are many of the problems concerned with rapid transit which is now of primary interest in passenger transportation.



A stack switch being brought up to a temperature of 900 deg F. in the heater box.



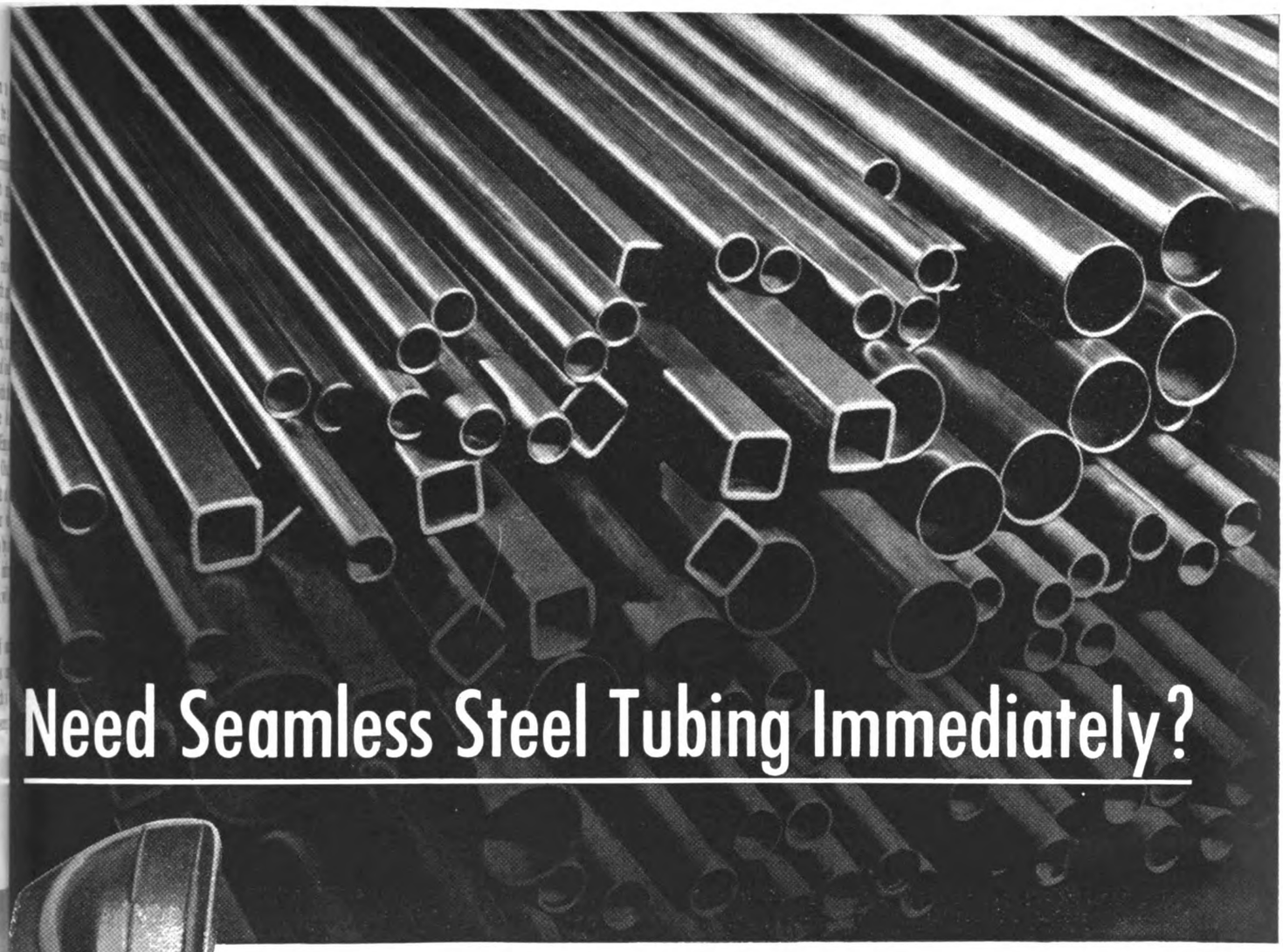
With the stack switch put in from one end and the thermometer from the other, the two sensing elements are side by side.

Stack Switch Checker

TEMPERATURE LIMIT switches for the stacks of Vapor steam generators are checked and adjusted periodically on the Chicago, Burlington & Quincy by means of the device shown in the illustration. It consists of a Baldwin cab heater in a 12-in. x 12-in. x 10-in. metal box which is insulated inside with asbestos and glass wool. The expanded metal on the outside protects the worker from coming in contact with hot surfaces.

The stem of the limit switch to be tested is pushed into a hole in one side of the box and a 0-950-deg mercury thermometer is pushed into a hole on the opposite side so that its bulb is adjacent to the stem of the switch.

The heating element is connected to a 120-volt power source and the temperature in the box reaches 900 deg F in about 30 minutes. In the process of bringing the temperature up, the switch is adjusted to open at 900 deg.



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Get "out-of-stock" delivery Call your USS Shelby Seamless Distributor!

WHY WAIT FOR DELIVERY when you can get all the top-quality Seamless Steel Tubing you need from your close-at-hand USS Shelby Seamless distributor?

Phone him, write him, drop in and see him—and you'll get prompt, courteous and efficient service, the likes of which you've never seen before.

• The consistent high quality of USS Shelby Seamless Tubing, its dimensional accuracy and superior machining characteristics make it easy to fabricate. Use it and cut tool costs, reduce rejects, save both time and money, and turn out a finer product.

• Shelby Seamless is available in round, square, rectangular, and other special shapes in any commercial size—from ¼" OD to 10¾" OD and in wall thicknesses from .035" to 2.000" . . . in a wide range of steel grades and anneals.

— Contact your Shelby Seamless Distributor now! —

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(Tubing Specialties)

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USS

SHELBY SEAMLESS MECHANICAL TUBING

WALLS WITHOUT WELDS

UNITED STATES

QUESTIONS and ANSWERS

General Motors

Diesel-Electric Locomotives

This series of Questions and Answers pertains to General Motors diesel-locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Items Essential in All Units of Locomotive

G653-Q—What is indicated if fuel does not show in the fuel return sight glass, when the fuel pump is running?
A—If the fuel is flowing in the other glass (45 lb) next to the return sight glass clogged fuel filters are indicated.

G654-Q—Can this condition be alleviated while on the road?
A—No.

G655-Q—What may be the trouble if fuel is not flowing in either glass?
A—The emergency fuel cut-off valve under the locomotive fuel tank may not have been tripped.

G656-Q—If this valve is properly set what other defect may be responsible?
A—The suction strainer may be clogged.

G657-Q—What may be done in this event?
A—If tools are available, the Wastex may be removed and the fuel element replaced without any Wastex.

G658-Q—What should be done if it is found that engine is stopped?
A—Pull the isolation switch handle up into *start* position.

G659-Q—What checks should be made?
A—The switches on the distribution panel should be closed and the fuses checked.

G660-Q—What should then be done?
A—The fuel pump should be switched *on* and the fuel return sight glass checked for a good flow of fuel.

G661-Q—What other check should be made?
A—It should be made certain that the low oil pressure trip button on the governor is pushed in.

G662-Q—What indicates that the trip button is pushed in?
A—The red part of the shaft does not show.

G663-Q—How should the engines be started?
A—The layshaft should be held part way open and the engine started by pressing on the *start* button.

G664-Q—What then should be checked?
A—The ground protective relays and the starting contactors.

G665-Q—What should be the position of the isolation switch if the engine throttle is in No. 2 position or lower?
—*Run* position

G666-Q—What do you do if the throttle is in No. 3 position?
A—Hold back on layshaft lever.

G667-Q—Why is this done?
A—To prevent a surge in engine speed.

To Ascertain If Engine Is Putting Out Power

G668-Q—If the throttle is in Run 8, pulling a train, how should the plate on the governor appear?
A—As shown in Fig. 511, page 509.

G669-Q—What may be wrong if the right hand scale reads idle, instead of 8?
A—The isolation switch may not be in *run*, or ground protective relay may be tripped.

G670-Q—If the right hand scale shows 8 but the marker on the left hand scale reads 8 to 10, what may be the trouble?
A—The engine is not loaded and there is probably electrical trouble.

G671-Q—What should be checked?
A—The battery field fuse.

G672-Q—What other defect may be responsible?
A—The control pressure may be low.

673-Q—If this does not correct the condition, what should be done?
A—The throttle should be reduced to *idle* momentarily and then return to *run 8* and the scales on the governor plate checked again.

G674-Q—How is the ground protective relay set?
A—By isolating the engine, pressing *on* the ground protective relay set button, and then placing the isolation switch firmly in *run* position.

G675-Q—What must be done if the relay continues to trip?
A—The engine must be isolated and shut down.

Failure Of Control Air Pressure

G676-Q—What may be the cause for failure to obtain control air pressure?
A—Control air may be shut off at the piping to the regulator or at the valve in the control cabinet.

G677-Q—What may be the cause for low pressure in the system?
A—The regulator may be set too low.

G678-Q—How should the knob on top of the regulator be turned to increase control air pressure?
A—Turn the knob clockwise to increase the pressure.

G679-Q—From what other cause may the air pressure be too low?
A—Control air is supplied from the main reservoir. If that pressure is low, it cannot operate the regulator to supply the control air system properly.

G680-Q—What are the maximum and minimum control air pressure allowable?
A—From a maximum of 90 lb to a minimum of 75 lb.

G681-Q—Is it permissible to proceed in the event of a defective regulator which allows control air pressure to creep up to that of main reservoir?
A—Yes, in case of emergency.

G682-Q—What does this locomotive consist of?
A—One unit rated at 1,500 hp.

G683-Q—What may take place in some cases?
A—In some cases, two or more units may be coupled together for multiple unit operation.

G684-Q—Do all of the GP-7 locomotives have the same type of air brakes?
A—No. They may be equipped with either of two types of air-brake equipment.

ALCO FREIGHT CAR TRUCK SPRINGS GUARANTEED FOR 10 YEARS

Uniform quality ALCO guaranteed springs are made to exceed AAR specifications; now you get even greater protection against replacement need.

On railroads around the world, ALCO springs have proved themselves again and again. They are so time-honored, ALCO can afford to guarantee these freight car truck springs against breakage for at least ten years.

ALCO FREIGHT CAR SPRING has date of manufacture stamped on coil. If it breaks within a period of ten years from that date, a new spring will be furnished free of charge by ALCO.

This ALCO guarantee applies to these springs*:
(Standard AAR Designs)

1. 2½-in. travel
2. 3⅛-in. travel
3. 3⅛-in. travel
4. 1915-D
5. 1936-D-2

*Except springs for brine refrigerator cars.

Order ALCO guaranteed freight car springs for your next requirements. You will be assured of top quality and superior service by one of the nation's largest railroad suppliers. Call your nearest ALCO Sales Representative or write Spring & Forge Division, Dept. SGR-3, P. O. Box 1065, Schenectady 1, New York.

ALCO

ALCO PRODUCTS, INC.

NEW YORK

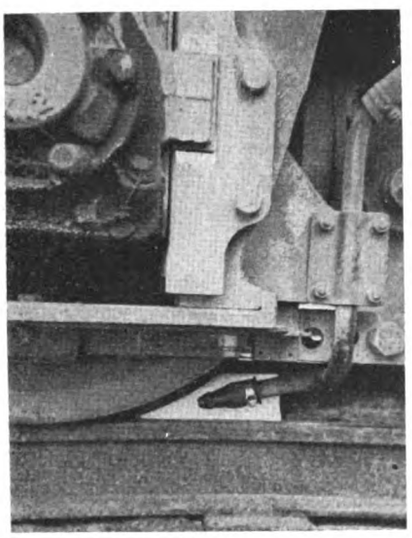
Sales Offices in Principal Cities

Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

(*Continued from page 10*)

try's specifications even under severe conditions.

Besides being moisture resistant, Transulite is lightweight, vibration resistant and durable. Its inorganic glass fibers will not burn, rot or sustain rodents and vermin. The material offers maximum resistance to sagging or settling when installed under industry accepted methods. *L. O. F. Glass Fibers Company, Dept. RLC, Toledo, Ohio.*



Sand Pipe Nozzle

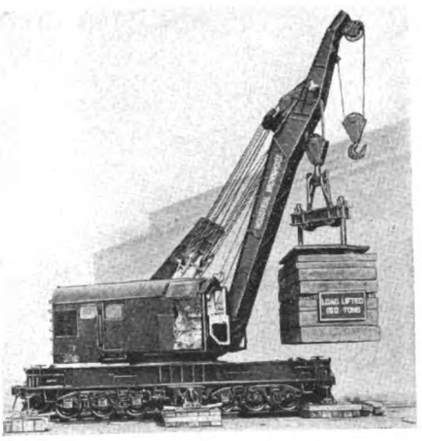
A rectangular Brewster No. 903 sand pipe nozzle is now available in addition to the current round-hole nozzle. It is made of Neoprene, and supplied with a hose clamp for application to ¾-in. 1-in. and 1¼ in. sand delivery pipes.

According to the manufacturer, the nozzle can be applied within ICC ruling of 2½ in. above the rail. The rectangular outlet is said to give a straighter flow of sand parallel to the rail, and the design does not permit water to travel up pipe through capillary action. Sand volume adjustment from ¾ to 1¼ lb. per min. per trap is recommended for the nozzle. *Morris B. Brewster Co., Dept. RLC, 8 South Michigan ave., Chicago 3.*

Wrecking Crane

A 150-ton diesel wrecking crane with operating cab at right front corner is designed to meet rail, bridge and trestle conditions where lighter axle load is necessary.

The diesel engine is equipped with a torque convertor, with all clutches and friction reverse clutches air operated. A

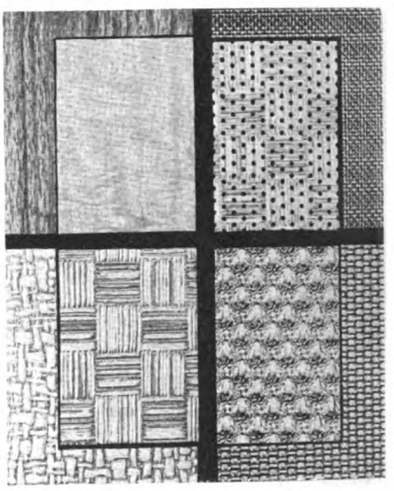


curved wrecking boom is welded steel construction with alloy steel members. The main and auxiliary hoist sheaves have roller bearings, while the auxiliary hoist has a swivel sheave. The car is built of welded and riveted structural members, including alloy-steel side sills. *Industrial Brownhoist Corporation, Dept. RLC, Bay City, Mich.*

Journal Jack

This 98-lb aluminum journal jack with a capacity of 200,000 lb is 12 in. in closed height and has a base diameter of 8¾ in. Two bail-type handles make the jack easy to carry.

The jack has a 4-in. raise and requires an effort of 120 lb to lift 100 tons. A lug on the ratchet makes it possible to spin the head, which is 5 in. in diameter, to load level rapidly. The jack is totally enclosed and packed with grease. It has a heat-treated lifting screw and bronze worm gear with a large capacity Timken roller load bearing. Its shell casting and base are of aluminum alloy. *Duff Norton Company, Dept. RLC, P. O. Bo 1889, Pit sburgh 30.*



Plastic Laminate

Pearsonite, a plastic laminate material, is said to behave amazingly like light-gage sheet metal and faithfully retain the most detailed three-dimensional forms. Typical uses in the transportation field include interior trim, scuff guards and acoustical headlinings.

The material will not burn and resists abrasion from continued hard use. Being almost completely chemically inert, it is maintenance free. The product is easily worked and assembled in flat or three dimensional form with simple tools and equipment used by fabricators of sheet metal, plastics, fiberboard and wood.

The plastic is available in over 3,000 variations of color, texture, gage and perforating pattern, in 40 in. and 48 in. wide continuous rolls of up to 100 yd. It may also be obtained in large production sheet sizes: 40 in. by 36 in., 40 in. by 48 in., and 48 in. by 96 in. *Metallic Plastics Corporation, Dept. RLC, 27-10 44th drive, Long Island City 1, N. Y.*

Hydraulic Power Cell

The Series 700 Power Cell is used with the manufacturer's Model 607 hydraulic tool designed for double-driving application of commercial or aircraft fasteners up to ½ in. size. The tool has an electrical toggle switch for selection of high or low operating pressure.

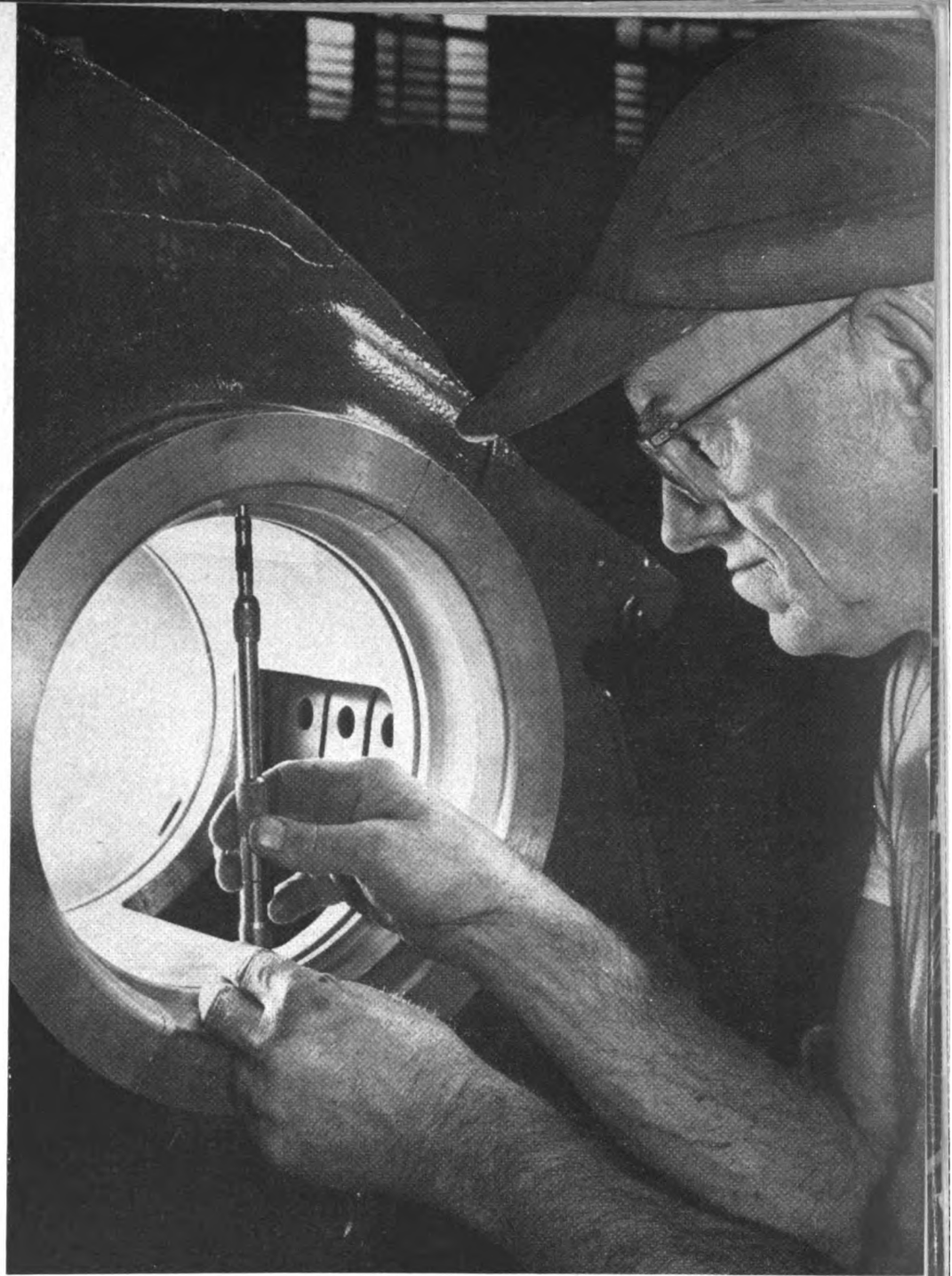
The power cell is a lightweight, porta-

(*Continued on page 78*)

General Electric Motor Support Bearings

SAVE OIL!

Are You Taking Full Advantage of This Important Benefit?



DURING RECENT ROAD TESTS, G-E motor support bearings were purposely bored out to simulate half-worn condition. Results from tests showed that even after wear, G-E bearings continue to save oil by returning excess oil to the axle cap.

General Electric motor support bearings have oil-return grooves. When you use these bearings on your locomotives in normal road and switching service, you'll find that up to 90 percent of the units can operate from monthly inspection to monthly inspection without the addition of oil to the axle caps.

DEVELOPED FOR GENERAL ELECTRIC'S GE-752 TRACTION MOTOR, these oil-return bearings have undergone extensive factory and field tests. These tests show that a locomotive in practically any type of service can get up to three times the mileage between oilings than would be possible with older style bearings. Besides giving you more miles between oilings, G-E support bearings give you long life and save maintenance dollars through reduced oil consumption and more economical oiling schedules.

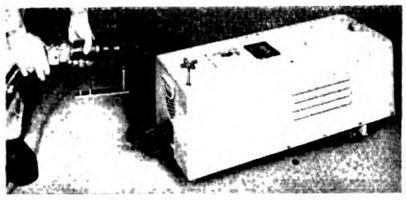
The wearing surface of all G-E lined motor support bearings is made of *tin base babbit* for better bonding and resistance to breakage and wear under today's tough operating conditions. Precision boring and rigid construction means still less wear on bearings and traction motor gear.

YOUR NEAREST G-E RAILROAD REGIONAL PARTS CENTER or your locomotive builder will be glad to tell you about all of the features which make G-E motor support bearings your best buy. Always specify G-E traction motor support bearings . . . the bearings that are designed as an integral part of your G-E traction system. General Electric Company, Locomotive and Car Equipment Dept., Erie, Pa. 128-41

Progress Is Our Most Important Product

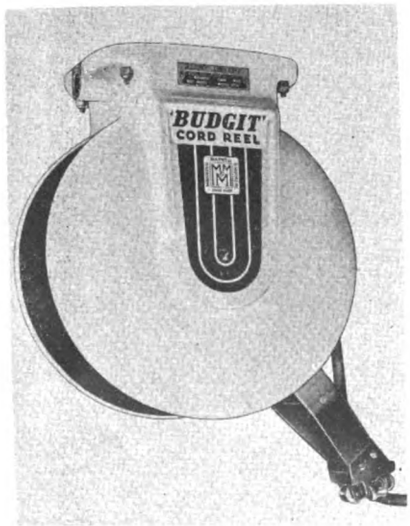
GENERAL ELECTRIC

(*Continued from page 76*)



ble electro-hydraulic generator. It is mounted on three casters for towing and equipped with handles for carrying. It is designed with two separate system relief valves, one for low pressure and the other for high pressure operation. The low-pressure circuit is adjustable between 600 and 1800 psi in the standard design. The high pressure relief valve is fixed at 3000 psi.

The device has an air-cooled hydraulic system of 6 qt oil capacity. It is available in three models equipped, respectively, for 110, 220 or 440 volt input power. The latter model is equipped with a transformer to convert the power supply to 110-volt current. The drive motor is a constant speed ac unit and is nominally rated at 1⅓ hp. *Huck Manufacturing Company, Dept. RLC, 2480 Bellevue ave. Detroit 7.*

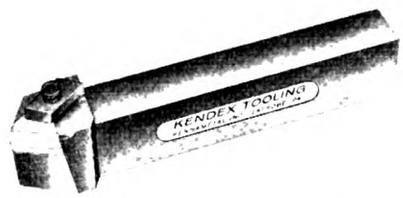


Cord Reels with High Hp Ratings

Six new models of cord reels have increased the maximum horsepower range of these devices from a previous 1 hp to a present 7½ hp.

The line now provides a reel to supply current to electric hoists, cranes and other electrically operated mobile devices with motors having these characteristics and maximum horsepowers:—110 volts, single phase, 60-cycle, ½ hp; 220 volts, 2 or 3-phase, 60-cycle 7½ hp. Wire sizes include a choice of No. 14 and 16 wire. Cord lengths up to 50 ft are available on certain models and when reels are mounted at the center of a runway or track, they will serve a track twice as long as the conductor cord. Rewinding is automatic.

The swinging guide rotates through an arc of over 290 deg and 4 rollers at its end feed the cord in any direction, even at right angles to the reel,—without cord damage. *Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Dept. RLC, Muskegon, Mich.*



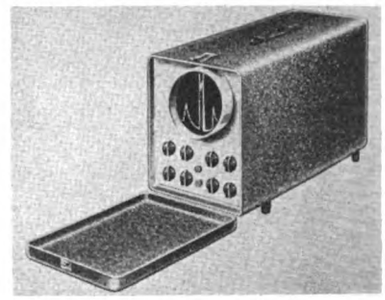
Throw-Away Insert Tools

These heavy-duty triangular carbide inserts are ⅝ in. inscribed circle and ¼ in. thick and are for use in three styles of holders. Style KTD-86A holders are for heavy plunge cutting on tracer control or automatic lathes. Style KTF-86A is for turning or facing on a square shoulder. Style KTG-86A is an offset tool for shaft turning or facing on a square shoulder. All holders are heat treated and have a hardened steel clamp and a solid carbide shim or seat. The inserts are available in either precision or utility types and are stocked n a number of grades. Chip breakers are available separately. *Kennametal Inc., Dept. RLC, Latrobe, Pa.*

Electronic Engine Analyzer

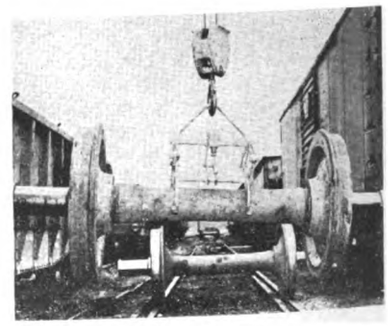
The Anal-O-Scope, provides a visual picture of the complete ignition system of an engine. Either battery or magneto operated systems may be tested. The device may be operated by 110-volt current or off an automobile battery. No power pack is required. Handling 6, 12, or 24 volt systems, the analyzer shows the firing cycle of any single cylinder, all 4, 6, or 8 at once, or parades one after the other.

The electrical performance of the entire circuit may be observed on the analyzer while the engine is running.



Complete, instantaneous analysis may be obtained of the dwell or cam angle, breaker point operation, distributor wear, condenser action, primary circuit leakage, spark plug action, secondary circuit resistance, secondary circuit insulation, ignition reserve and valve action. The easy to read trace pattern amplifies either horizontally or vertically on the large 5-in. tube.

The unit is light in weight and portable. It comes complete with a power timing light and a full set of spark plug adaptors. *Snap-On-Tools Corporation, Dept. RLC, 8028 28th Ave., Kenosha, Wis.*

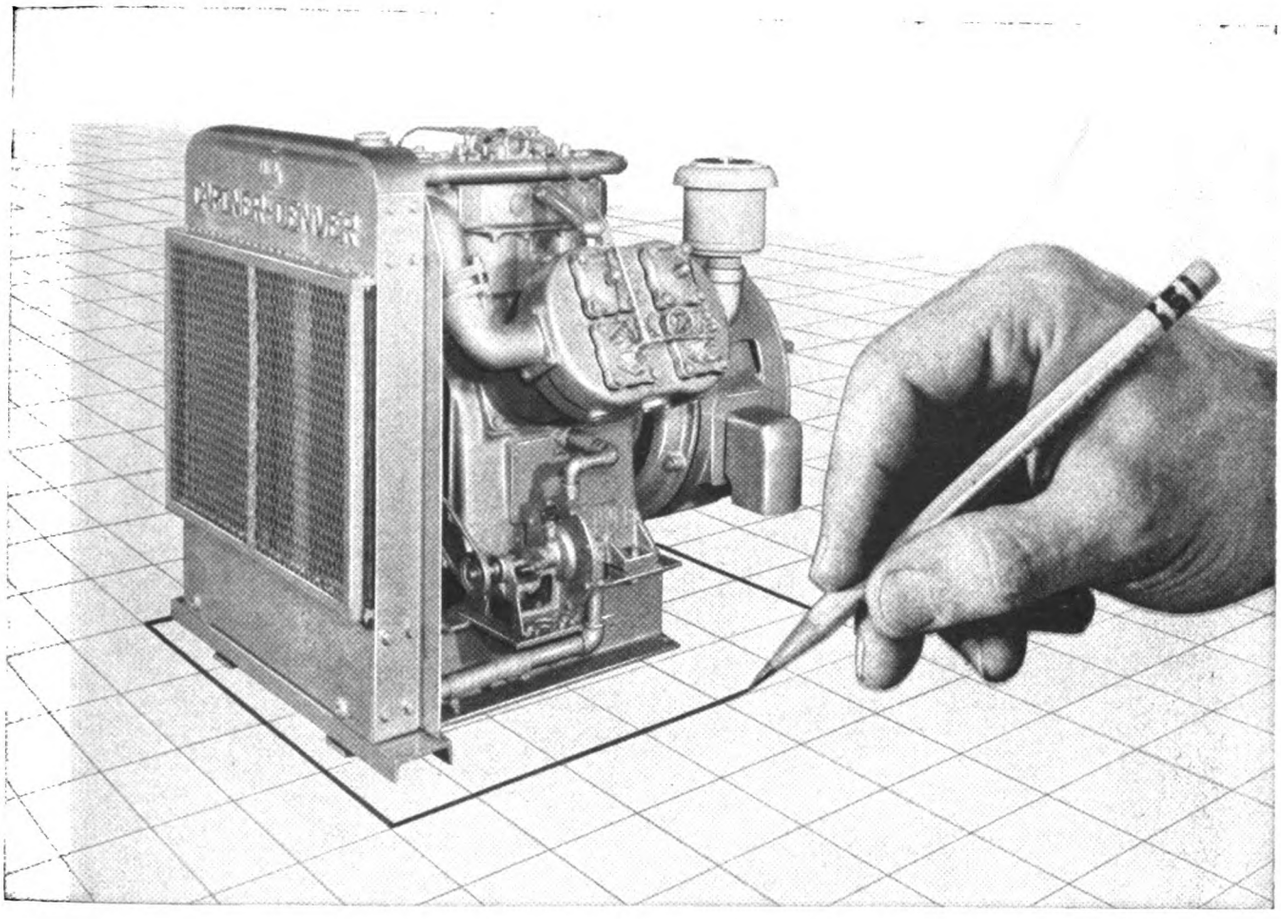


Automatic Tongs

With these heavy-duty automatic tongs, railroad wheel and axle assemblies weighing up to 3,500 lb each can be lifted quickly and easily. The tongs have a maximum jaw opening of 9 in. for fitting around an axle. Two pairs of jaws, 18 in. apart are controlled by a single automatic locking unit on the spreader bars.

The tongs are suspended from a crane with a long boom mounted on a four-wheel truck, and lowered over an axle with its jaws locked open. Lowering them a few additional inches to create slack releases the automatic locking mechanism, so that when the tongs are raised they close against the axle. The load, while it is in the air, cannot be released. *Heppenstall Company, Dept. RLC, Fifth ave and 16th st, New Brighton, Pa.*

(*Turn to page 88*)

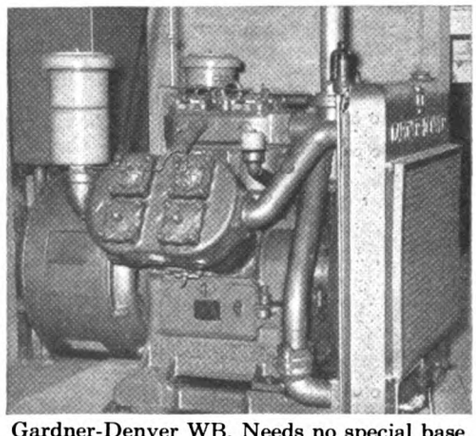


SPACE PROBLEM?

These compressors can help solve it

With space around car and engine shops always at a premium, you can't afford to "bottle it up." Here is a compact source of air power you don't have to scratch your head to find a place for—a Gardner-Denver WB. You can get 686 c.f.m. in a 67″ x 67″ space. Take a look at the specifications:

Length	Width	Motor H.P.	Model
39″	47″	25	WBR
40″	52″	40	WBE
49″	52″	50	WBQ
56″	56″	75	WBH
67″	67″	100	WBK
67″	67″	125	WBJ
72″	68″	200	WBN



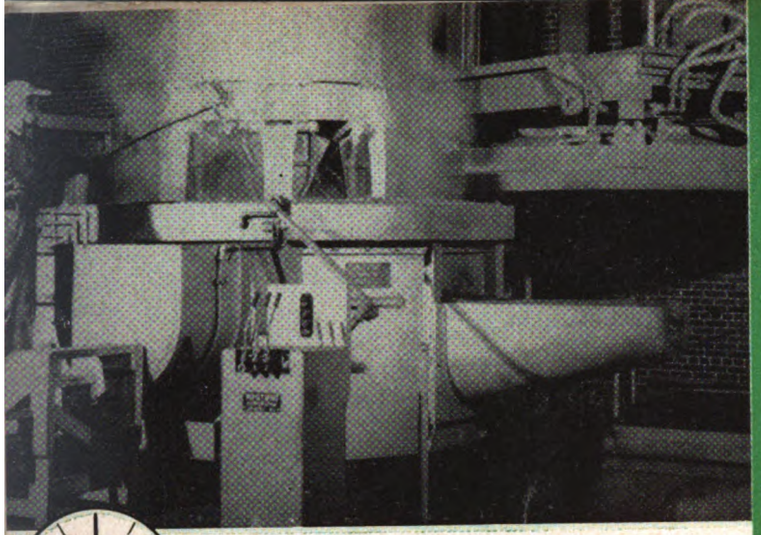
Gardner-Denver WB. Needs no special base —just bolt down, hook up and you have a steady, dependable source of air.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

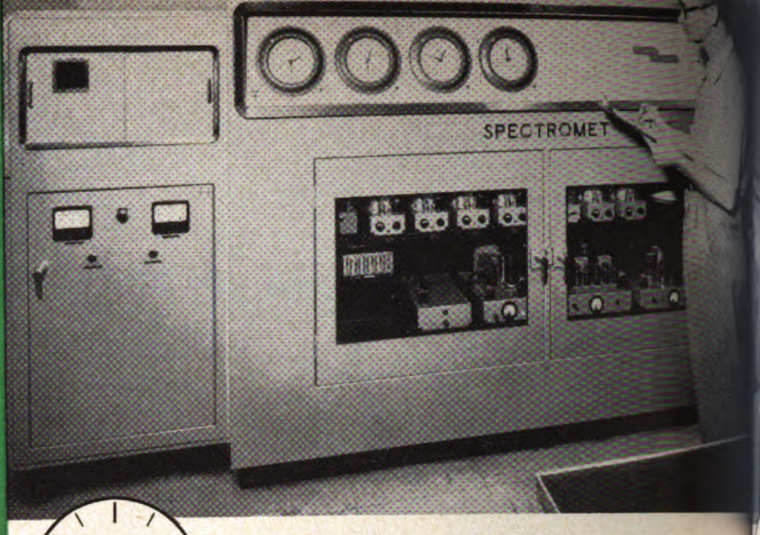
GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

IN CANADA: GARDNER-DENVER COMPANY, (CANADA), LTD.
14 CURITY AVENUE, TORONTO 16. ONTARIO



9:00 a.m. Charge! With an air-splitting roar the electric furnace swallows the rigidly selected steel scrap, and the electrodes take their bite. In order to obtain Southern wheel's unique carbon steel, with its precise blend of alloying elements, the charging mixture must be an exact balance of selected and weighed materials. Now the strict timetable of quality control begins . . .



10:40 a.m. Rapid steel analysis. Less than two hours after charging the furnace, the last analysis of alloying elements in the molten metal is made on a direct reading spectrometer. Finished in a matter of minutes (as compared to older methods that required several hours) the analysis is rushed by air tube to the metallurgical control engineer, and the steel is ready to . . .

from steel scrap

to rolling wheel

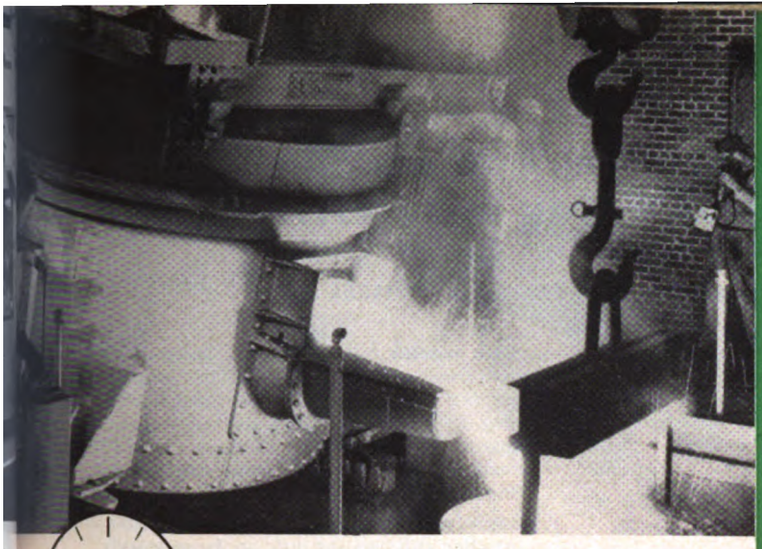
A Tough Timetable

10:59 a.m. Cast! The mechanized conveyor moves the molds into position and the steel is poured. There is a hiss of flame and flung spark as the metal hits the mold cavity. Made on highly automatic equipment, these molds are engineered to utilize the strength of cast steel to the utmost. Slowly cooling, the wheel molds move on to shakeout and . . .

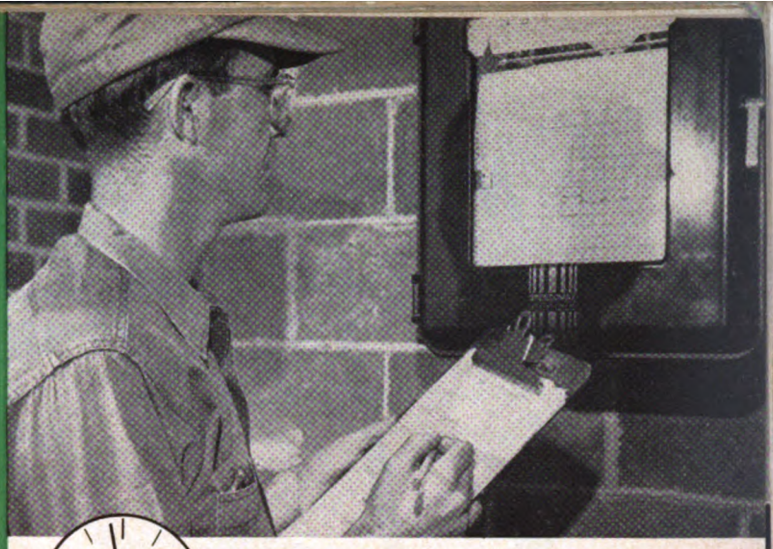
rigidly timed quality control packs more value in Southern® cast steel wheels

Casting quality into Southern steel wheels — quality that means more value for the dollar — is a dramatic, almost split-second job. From the moment the carefully selected scrap hits the electric furnace to the precision machining of the hub and tread, skilled experts commanding a battery of electronic measuring equipment call the shots in this exciting casting story.

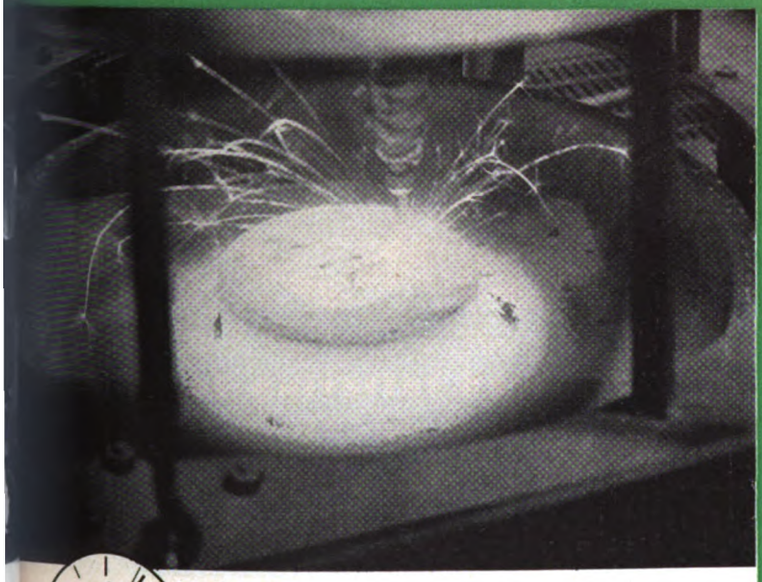
Result? Freight service wheels of uniform quality that consistently roll farther and cost less — *Southern cast steel wheels.*



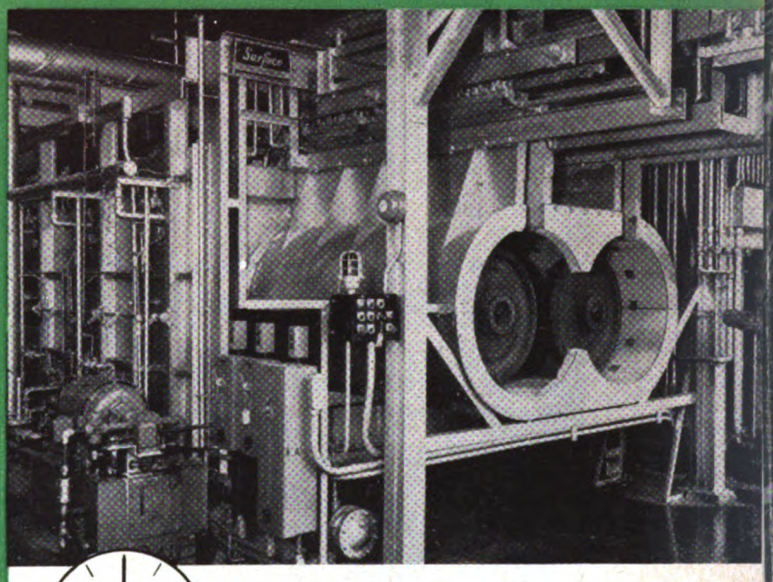
10:45 a.m. Pour! The furnace tips and white hot metal thunders into the reservoir ladle. The timing is growing more delicate as the seconds pass, for once out of the furnace, the steel begins to cool. Under the ever-watchful pyrometer of the metallurgical control engineer, who keeps a careful record of time and temperature, the steel is transferred at the right moment to the pouring ladles, to await the . . .



10:58 a.m. Approach to casting temperature. The metallurgical control engineer watches the moving temperature graph of the thermocouples that have been dipped in the pouring ladles. Southern cast steel wheels are cast only when the molten steel is within a very narrow range of temperature. This is one of the secrets of Southern wheel quality. At the right moment the wheels are . . .



12:07 p.m. Rough cut of hub. The conveying system is carefully timed to bring the wheel to the next critical step: rough cut of the hub. An oxy-acetylene torch smoothly and automatically slices out a glowing cylinder of metal from the wheel's center in minimum time. In this way heat effects are eliminated. After slow and carefully timed cooling in the annealing pits . . .



7:00 p.m. Heat treatment. The wheels are moved to the two-stage, heat-treating furnaces. Here they are given an electronically controlled heat treatment that lasts about 16 hours, insuring a refined grain structure and exceptional toughness. The wheels are then shot-blasted, inspected and ready for . . .

Precision machining. The cast steel wheels are machined at a single chucking on special automatic vertical turret lathes, insuring dimensional accuracy and true concentricity. All that remains now is final inspection and the wheels are off to their job of providing the railroads with more value for the dollar.

AMERICAN
Brake Shoe
COMPANY

RAILROAD PRODUCTS DIVISION

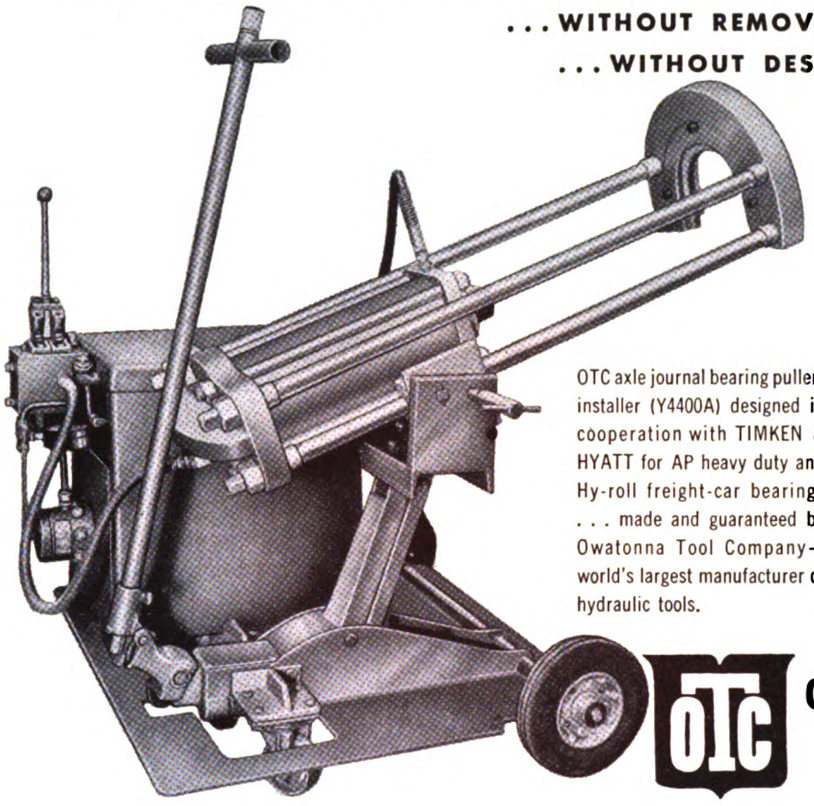
530 Fifth Avenue • New York 36, N. Y.

GRADED TO PRODUCE
RPI
MEMBER

NOW—ONE MAN ... can pull, install axle journal bearings IN MINUTES...

...WITHOUT REMOVING CAR WHEELS

...WITHOUT DESTROYING WHEEL FIT



OTC axle journal bearing puller-installer (Y4400A) designed in cooperation with TIMKEN & HYATT for AP heavy duty and Hy-roll freight-car bearings . . . made and guaranteed by Owatonna Tool Company—world's largest manufacturer of hydraulic tools.

Slash manhours—slash labor costs—slash lost time—with this new OTC journal-bearing puller-installer. One man has 74 tons hydraulic pressure on tap—muscle aplenty to remove even stubborn "frozen" bearings—and 53 tons pressure to press home the tightest fit.

Entirely self-contained, this OTC puller-installer rolls to the job on large wheels (two swiveling). Puller frame raises or lowers hydraulically to the right height, tilts to fit over axle-bearing assembly.

Puller-installer is complete with OTC double-acting ram, 2-horsepower electric motor, piston-type pump, 2-gallon hydraulic reservoir, 3-way hydraulic control valve, pressure gage, hydraulic lift for raising and lowering tiltable puller frame.

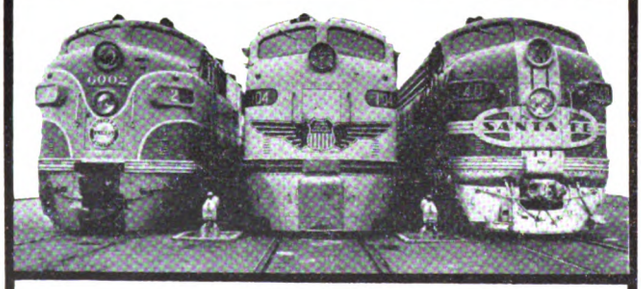
Complete details in OTC bulletin HYRR 57 —see your OTC representative or write

OTC **OWATONNA TOOL COMPANY**

495 CEDAR STREET

OWATONNA, MINNESOTA

THREE LOCOMOTIVES in California Rendezvous



...all equipped with SPRAGUE AIR-PUSH Windshield Wipers!

Locomotives of three railroads approaching camera on parallel tracks in Los Angeles recently in observance of "Invest in America Week." They are (from left) Southern Pacific, Union Pacific, and Santa Fe. All three are equipped with Sprague Air-Push Windshield Wiping Equipment, as are 95% of all modern diesel locomotives!

Sprague DEVICES, INC.

MICHIGAN CITY, INDIANA

America's foremost engineered lettering tools

designed to reduce your present costs **50 to 80%**

Used today by 1/3rd of the Nation's leading Railroads . .

DN

Spray it— **STENCILS**

PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

For additional information write Dept. RR-100

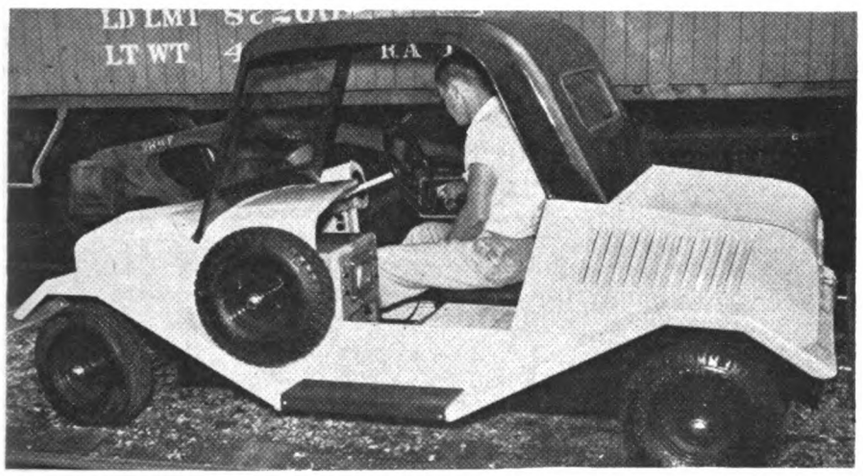
THE DEMP-NOCK COMPANY

21433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.

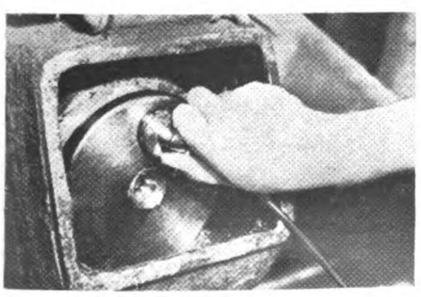
DEMP NOCK

HELPING TO KEEP YOUR ROLLING STOCK SAFE

TEST 320 FREIGHT CAR AXLES A DAY AT 8.2 CENTS AVERAGE COST PER JOURNAL

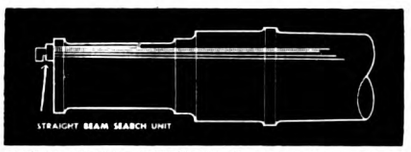


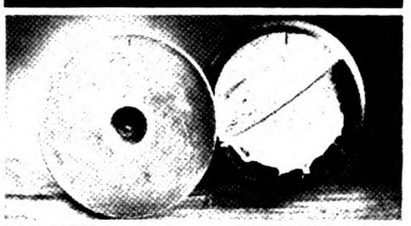
Sperry Journal Test Cars in use on one of the country's leading railroads have achieved these results over more than a year's operations. Other accomplishments are equally impressive. Through January 1957, a total of 153,198 freight cars were checked. On these cars 328 cracked and defective axles were discovered. Findings to date average one faulty axle for every 467 cars inspected.



The Sperry Journal Test Car provides for fast, simple and positive journal testing. The operator drives the Test Car easily and rapidly alongside freight cars on the track; testing is done without leaving the car and one operator can check up to 80 cars daily.

HOW TO "DRIVE-TEST" WITH REFLECTOSCOPE®





DEFECTIVE GOOD

The search unit, *placed on the end of a freight car journal, beams ultrasonic sound waves through the axle. Any defect, crack or flaw in the journal interrupts the sound beams and sends its reflection back to the Reflectoscope, where it is pictured on a cathode ray tube. The sketch shows an axle defect and its picture on the tube, which is mounted directly in front of the driver's seat.*

Mechanical Departments *gain benefits in time, labor and money from this speedy, sure method of journal testing. Your Sperry Sales Engineer will be glad to give you the complete details. If you wish, we will send you literature.*

Sperry

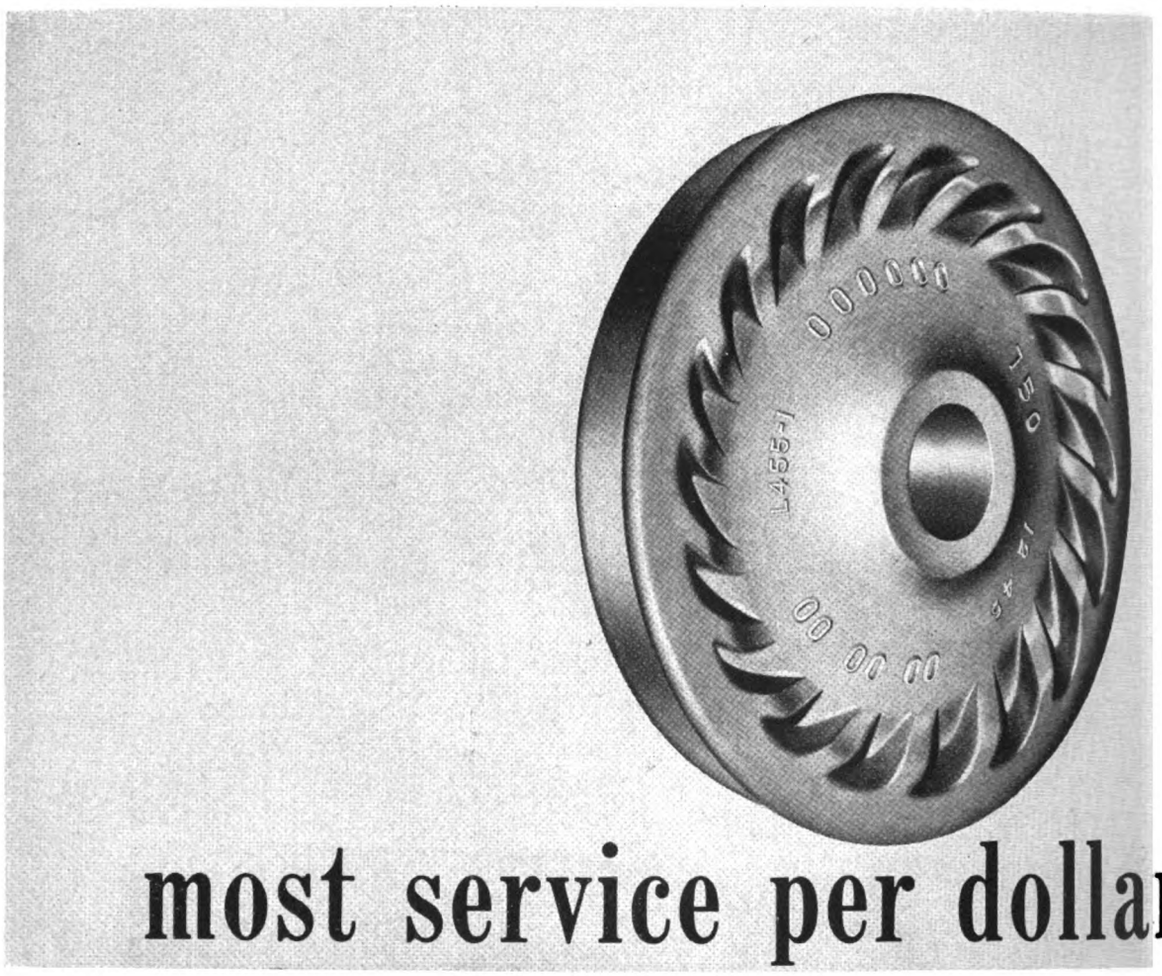
SPERRY RAIL SERVICE

Division of Sperry Products, Inc. · Danbury, Connecticut

Supplying Railroads Exclusively

Sperry

New York, N.Y., 60 East 42nd St. · Chicago, Ill., 80 East Jackson Blvd. · St. Louis, Mo., 818 Olive St.



most service per dollar

Low cost and high quality go hand in hand in today's chilled wheel and give you a maximum of service for a minimum investment.

want good performance?

Association chilled car wheels have an excellent over-all safety record in freight car service. According to ICC records the safety curve goes steadily upward.

want economy?

Association wheels are low in first cost, high in exchange value, and permit lower inventories because they are available on short notice from nearby Association plants.

The wheel to use, if you want a *combination* of quality performance and economy, is the Association chilled car wheel.

in good supply
available locally
short-haul delivery
reduced inventory
low first cost
low exchange cost
increased ton mileage
high safety standards
plant inspection
easier shop handling

RAILWAY WHEEL ASSOCIATION

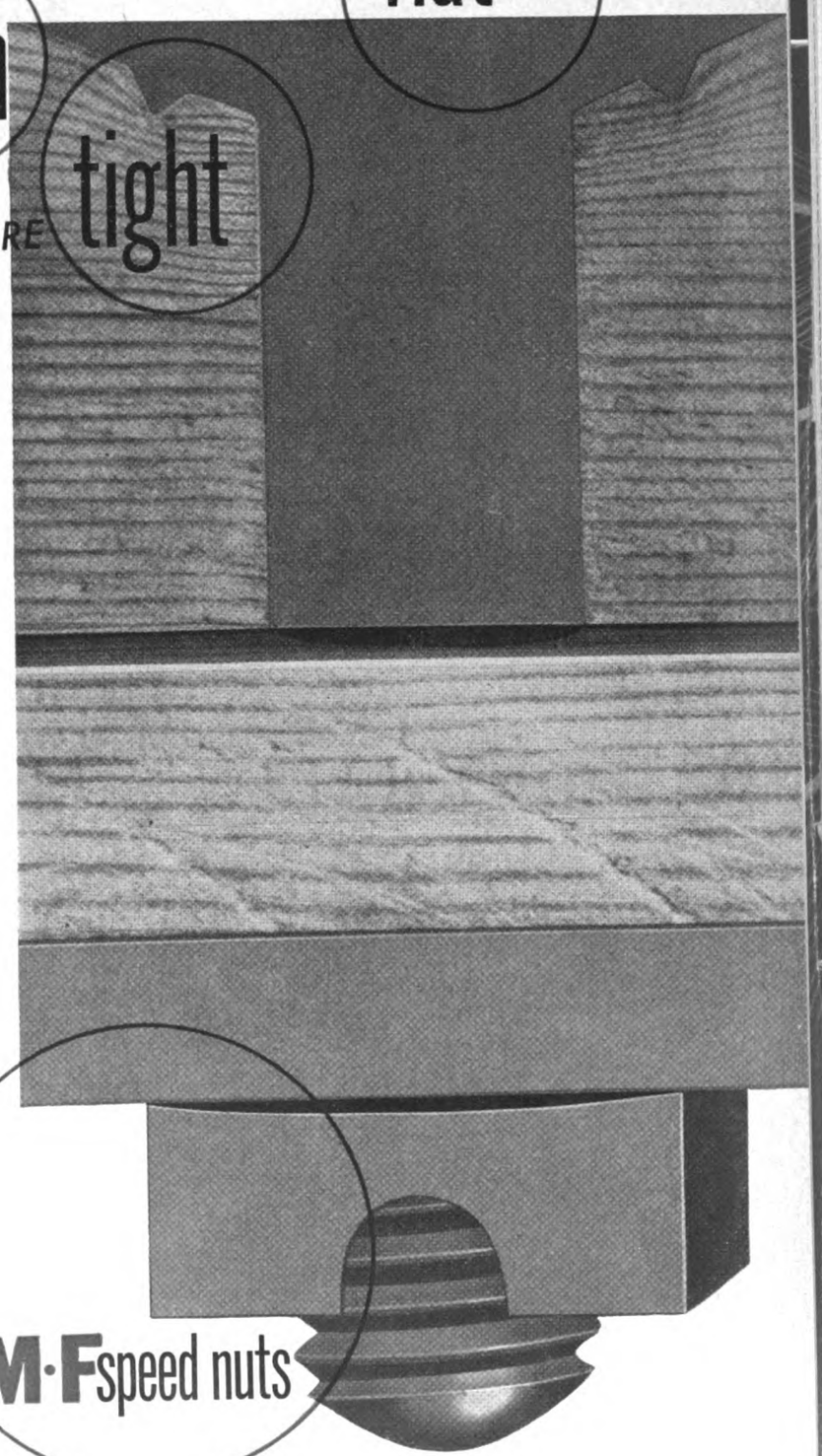
(Formerly Association of Manufacturers of Chilled Car Wheels)
445 North Sacramento Boulevard, Chicago 12, Ill. • Albany Car Wheel Co. ACF Industries • Griffin Wheel Co. • Marshall Car Wheel & Foundry Co. Pullman-Standard Car Mfg. Co. • Railroad Products Div., American Brake Shoe Co. • Canada Iron Foundries, Ltd. • Canadian Car & Foundry Co., Ltd.

3 reasons why M·F Water-Tight bolts make BETTER FLOORS

smooth ..... BECAUSE THEY'RE flat

clean....BECAUSE THEY'RE flush

dry.....BECAUSE THEY'RE tight



Shippers want safe delivery, not damage claims. A flat, flush, *dry* surface ensures lading protection. And, because M·F Water-Tight bolts require no countersinking, their added protection costs less to start with!

The M·F Water-tight ring prevents the entrance of moisture and decay, too—reduces flooring maintenance.

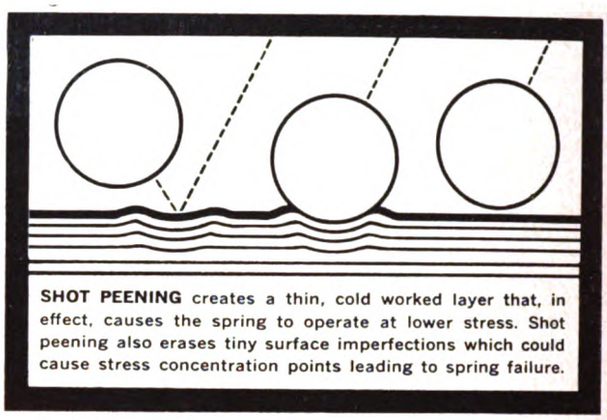
SAVE LADING . . . SAVE LABOR . . . SAVE FLOORING with *M·F WATER-TIGHT BOLTS.*

Maintenance free BECAUSE THEY'RE LOCKED WITH M·F speed nuts

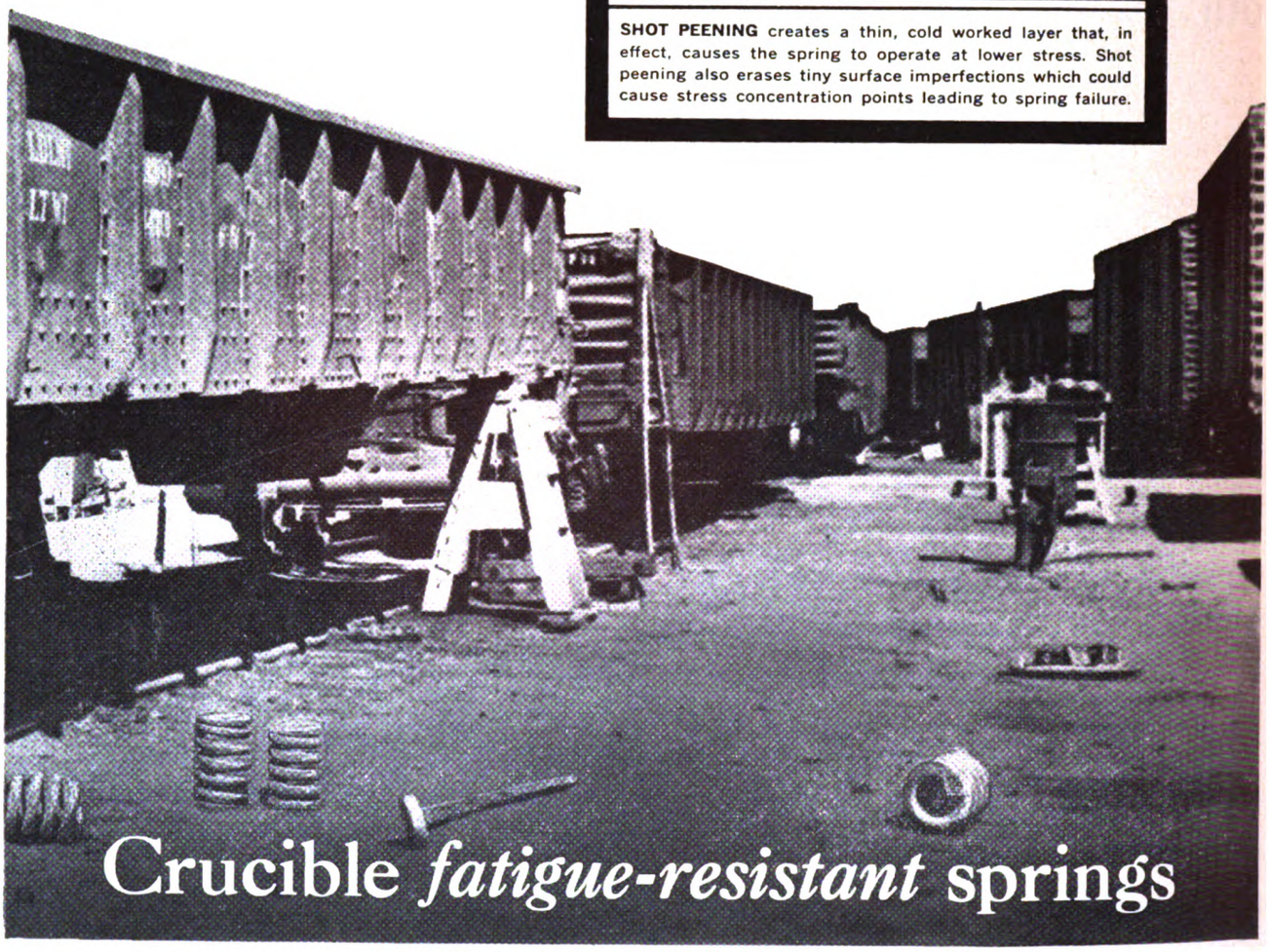
MACLEAN-FOGG LOCK NUT COMPANY
5535 N. Wolcott Ave., Chicago 40, Ill.

In Canada: The Holden Co., Ltd., Montreal

made stronger to last longer



SHOT PEENING creates a thin, cold worked layer that, in effect, causes the spring to operate at lower stress. Shot peening also erases tiny surface imperfections which could cause stress concentration points leading to spring failure.



Crucible *fatigue-resistant* springs

cut bad-order car expense

You can help keep cars off the repair tracks with Crucible's *fatigue-resistant* springs. They're single heat treated and shot peened – *made stronger to last longer* – yet they cost no more than conventional springs.

Because they last longer, Crucible *fatigue-resistant* springs reduce replacements due to spring failures–90% of which are caused by permanent set.

Fatigue-resistant springs can maintain their load-carrying capacities over longer periods because they have better hardenability, higher elastic limits and greater resistance to working stresses. Crucible ensures these qualities in every spring through strict manufacturing control from ore through final, rigorous compression tests.

Crucible single heat treated *fatigue-resistant* springs are your best guarantee of low-cost, long-lasting spring performance. For details, write for folder: *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

CRUCIBLE spring division

Crucible Steel Company of America

TEAMED UP TO WITHSTAND THE EFFECTS OF VIBRATION

These outstanding railroads and the builders of the cars they use are upgrading their requirements for vibration resistance and safety in freight cars. The stresses of today's high speed diesel operations demand it. Elastic Stop® nuts are being specified in many areas because they will not loosen under the vibrations set up in high speed operations. Association of American Railroads Rule 101 recognizes this with the following: *"Elastic Stop nuts applied are chargeable on the basis of Rule 105 when standard to car."* Thus, this rule calls for the replacement of Elastic Stop nuts with Elastic Stop nuts. This is important because Elastic Stop nuts reduce cost of maintenance and inspection to a minimum.

For details of the how . . . where . . . and *why* of Elastic Stop nut application to freight car vibration and maintenance reduction, write Dept. N35-1128.

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road, Union, New Jersey

every drip means a drop in

FUEL ECONOMY

STOP WASTE . . . Specify the New Roylyn "NON-SPILL" Fueling Valve

Actual road tests have proved that less than a spoonful of fuel is wasted during each fueling operation with Roylyn equipment... just a drop in the bucket when you consider the oil-soaked loading areas of the past.

Unnecessary drippage and spillage of diesel oil on and about loading facilities have long been a costly problem to the railroads . . . AND, a fire, accident and disposal problem to both the railroads and the communities served.

FOOLPROOF AND FREE-FLOW OPERATION . . . (1) Prior to engagement (2) Engaged with Valve Closed (3) Valve Open and Clear Fuel Flowing.

Here's What This Equipment Will Do For You . . .

- ELIMINATE SPILLAGE OF FUEL
- REDUCE FIRE AND ACCIDENT HAZARDS
- LOWER MAINTENANCE COSTS
- MINIMIZE FACILITY CONTAMINATION
- LOWER EQUIPMENT COSTS
- IMPROVE PUBLIC RELATIONS

ROYLYN R RAILROAD PRODUCTS

Write for your copy of Brochure fully describing Roylyn's "Non-Spill" Coupling-Valve!

AIRATERRA

620 Paula Avenue • Glendale 1, California
CHapman 5-1196 • CItrus 2-1146 • TWX 7158 WUX

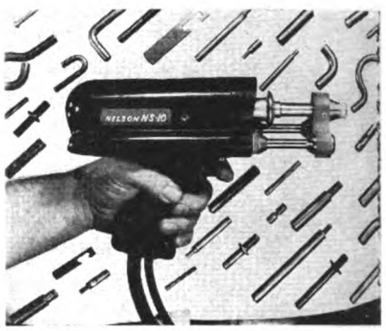
FOR RELIABILITY... SPECIFY ROYLYN RAILROAD PRODUCTS

U. S. Sales Representative: Equipment Research Corp. 64 East Jackson Blvd. Chicago 4, Illinois

Canadian Representative: Anthony Foster & Sons, Ltd. 294 Church Street Toronto, Ontario, Canada

What's New

(*Continued from page 78*)



Stud Welding Gun

This NS-10 stud welding gun is 9 in. long and weighs approximately 4 lb—about a third less than earlier units. It is balanced for easy handling and will weld all studs up through ½ in. diameter. *Nelson Stud Welding Division, Gregory Industries, Inc., Dept. RLC, Lorain, Ohio.*

Cargo Heater

This Model TH-11 cargo heater which complies with ICC regulations and is designed for protection of perishable shipments, produces up to 11,000 Btu's of heat per hour. It burns methyl alcohol and is thermostatically controlled to produce temperatures from 30 to 70 deg F. It will burn for 30 hr on full flame without refuelling. It is said to be free from any poisonous gas or fumes that might damage produce or humans, requires no outside venting, is explosion-proof, and has built-in tip over safety valves. *Presco Incorporated, Dept. RLC, 6300 E. Slauson ave., Los Angeles 22, Cal.*

Supply Trade Notes

L-O-F GLASS FIBERS COMPANY, CORRULUX DIVISION.—*Gordon E. Walls* has been appointed northeast regional sales manager, at New York. Three new district sales managers are: *William G. Catchcart, Jr.*, at Chicago; *Fred A. Laake, Jr.*, at Dayton, Ohio; and *Henry B. Selby*, at Charlotte, N. C.

CRUCIBLE STEEL COMPANY OF AMERICA.—*John J. Bollinger* has been appointed sales representative, midwest-

(*Continued on page 92*)

WABCO® Packing Cups take the punch and bounce back

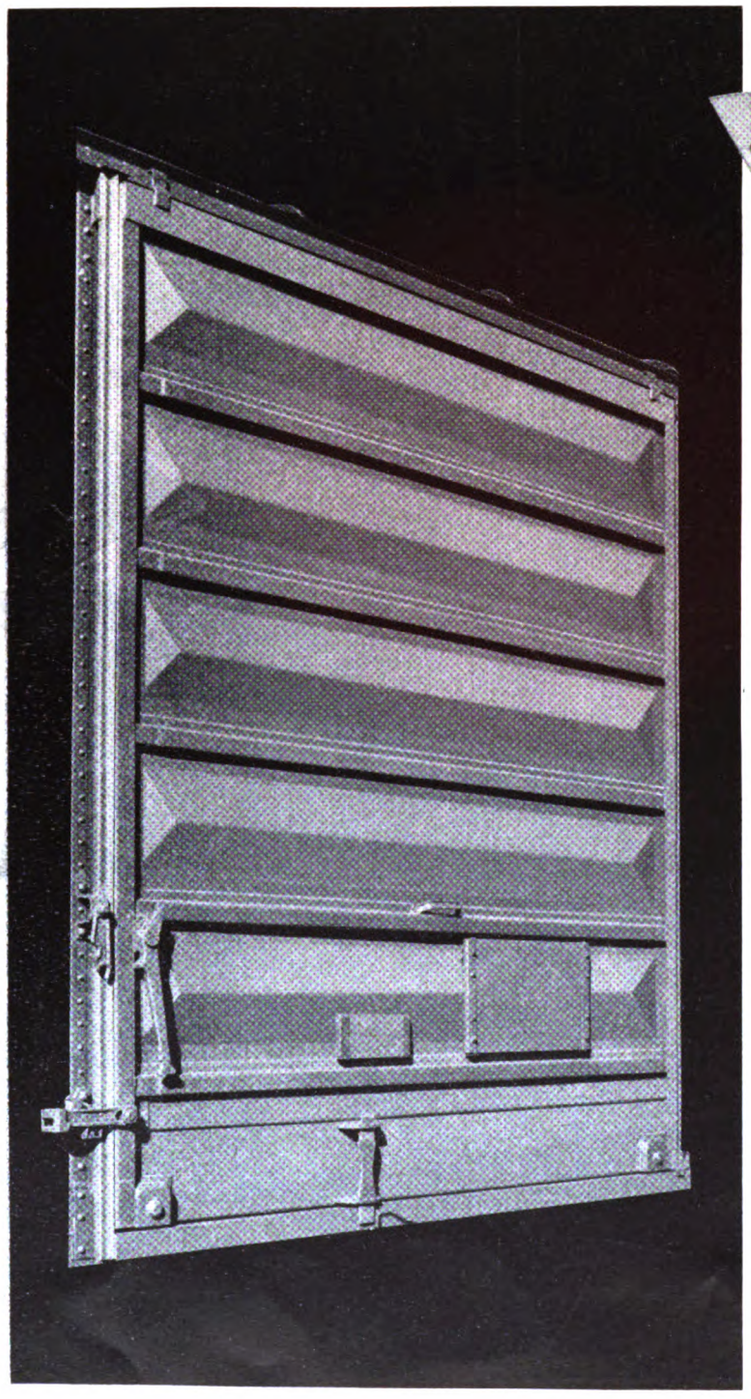
The ability of Wabco composition to bounce back and regain its original contour after deflection has made it amazingly successful in air brake packing cups, as well as seals and gaskets. It is this unmatched resiliency that has reduced brake system leakage to a previously unattainable minimum. It made it possible to extend maintenance intervals because of the longer service life.

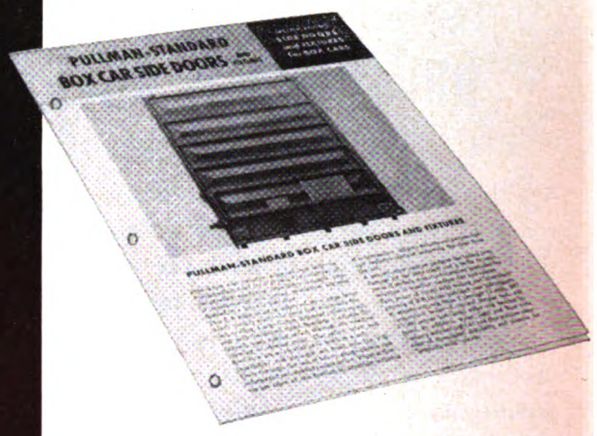
To maintain top performance, be sure to use genuine Wabco parts. Specify them by name. Each Wabco Packing Cup carries the trade-mark, date of manufacture, mold number and piece number. Thus you can order and get the same high-quality parts time after time.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

WABCO Dated Packing Cups

P-S Box Car Side Doors





This booklet will give you the facts ...write for it

Every pertinent fact regarding operating characteristics, strength and durability, maintenance ease and simplicity, lading protection qualities and laboratory and service testing of the P-S Box Car Side Door is included in this to-the-point booklet. Write for a copy now . . . study it . . . compare this door to any on the market. And when you do, no matter what comparisons you make—economy, durability, lading protection—you'll find the Pullman-Standard Box Car Side Door offers the best value to your railroad.

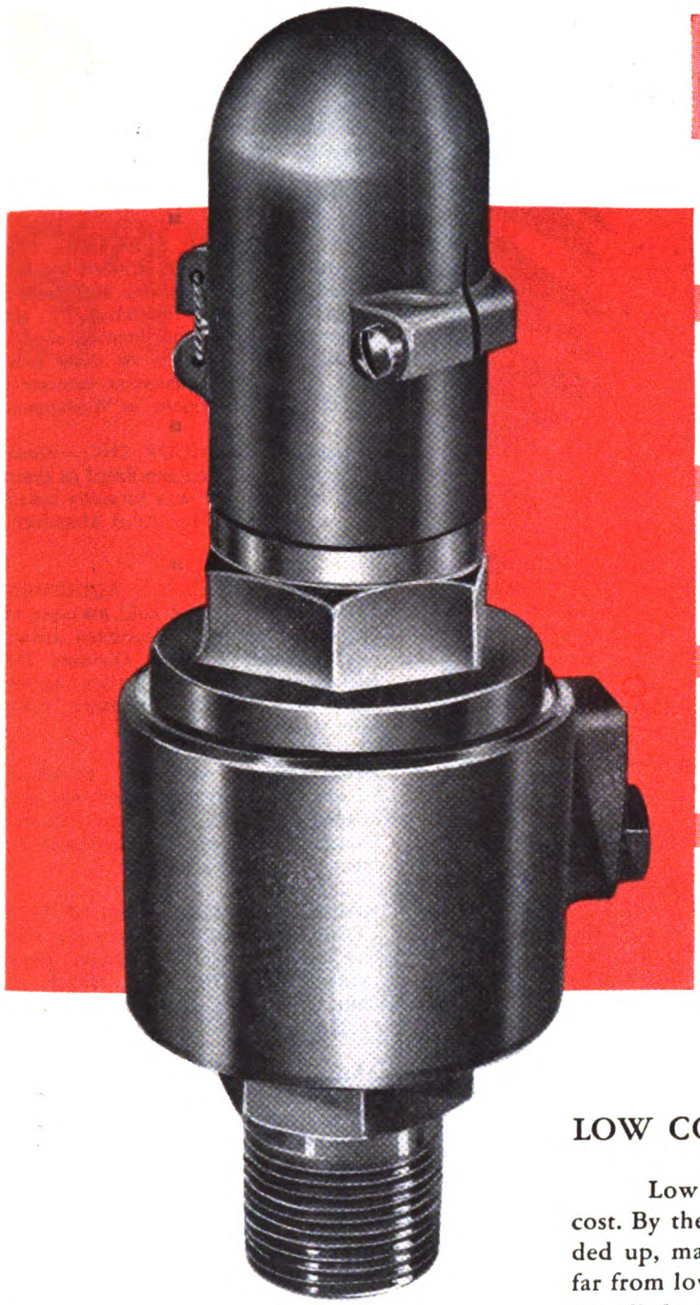
WORLD'S LARGEST BUILDER OF ROLLING STOCK

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO



THE NEWEST CONCEPT IN SAFETY VALVES

LOW COST RESERVOIR SAFETY VALVES

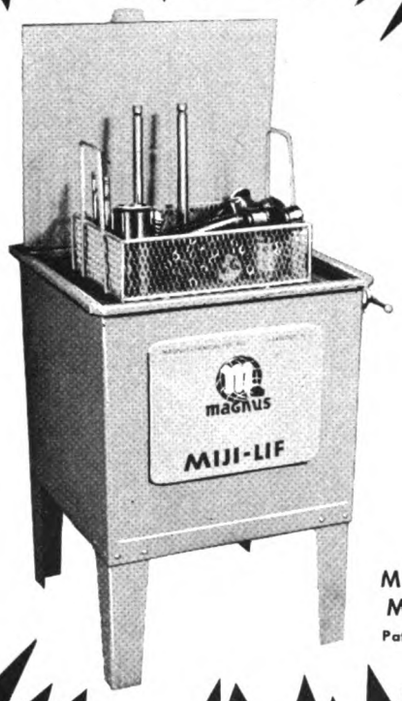
Low initial cost does not necessarily mean low overall cost. By the time installation and maintenance costs are added up, many a "bargain" valve turns out to be something far from low cost. The J-1 main reservoir safety valve is low cost *all the way* . . . low initial cost . . . low installation cost . . . low maintenance cost.

In the atmosphere of compressed air and oil vapors common in diesel-electric locomotives, the J-1 safety valve is not subject to galling and sticking caused by deposits as are other valves. The most economical reservoir safety valve you can specify for new equipment, The New York Air Brake Company's J-1 safety valve is also the best for replacement part application. The wide range of pressure settings (85 psi to 225 psi) makes the J-1 easily adaptable to the requirements of equipment already in service on your road.

THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.

ANNOUNCING



MAGNUS
MIJI LIF
Patents Pending

NEW, LOW-COST
AGITATING CLEANING MACHINE!

. . . Puts the proven advantages of mechanically agitated cleaning within reach of every railroad shop.

Specifically designed to provide low-cost agitating cleaning of small parts (such as maintenance-of-way equipment, signals, air brakes, injectors and governors, etc.), this new development by the inventors and creators of the Magnus Aja Lif Cleaning Machine offers:

★ DUAL AGITATION—of parts and liquid, for fast, thorough economical cleaning.

★ AIR OPERATION—for easy installation and safe, sturdy operation.

★ BATTLESHIP CONSTRUCTION—or lasting 14 gauge sheet steel.

★ 75 POUND CAPACITY—21″ x 18″ platform.

★ SINGLE LEVER OPERATION—to raise or lower work automatically.

Write today for free information to Magnus, 77 South Avenue, Garwood, New Jersey.

magnus

RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
—a world-wide organization specializing in cleaning and protection of all surfaces.

Supply Trade Notes

(*Continued from page 88*)

ern region, for the Spring Division of Crucible Steel at Chicago. He was formerly manager of employee relations, Pittsburgh.

■

WESTINGHOUSE ELECTRIC CORPORATION.—*Fred E. Everett* has been named manager of marine and transportation section, East Pittsburgh, Pa., with responsibility for coordinating sales of Westinghouse products to these industries. He has been assistant manager of the marine department in Washington.

■

AMERICAN PAMCOR, INC.,—*Donald F. Miersch* has been appointed as general sales manager. He was formerly consultant on marketing for Avco Manufacturing Corporation.

■

INTERNATIONAL EQUIPMENT COMPANY.—*T.T. Arnold,* manager, railway sales, has been appointed assistant vice-president, Railway Division. *D.D. Richardson,* sales and service engineer, has been appointed manager, railway sales, Railway Division.

■

COLLINS & AIKMAN CORP.—*C. Russell Warren* appointed to newly created post of sales manager, Railroad Division, Transportation Fabrics Department.

■

KAISER ALUMINUM & CHEMICAL CORPORATION.—*Clarence W. Higbee* has been appointed assistant general manager, and *Gillette N. Houck,* sales manager of the newly established Electrical Conductor Division.

■

AMERICAN STEEL FOUNDRIES.—ASF has announced plans for constructing and equipping a second Canadian plant in Transcona, Man., for the manufacture of EQS cast-steel wheels for freight cars. The plant will be operated by Griffin Steel Foundries Ltd., a subsidiary of ASF at St. Hyacinthe, Que. The Transcona plant will be patterned after the two new plants of the Griffin Wheel Company in Chicago and Colton, Cal., and will have a capacity of approximately 100,000 wheels a year. Operation is expected to begin during the latter part of 1958.

■

SIMMONS-BOARDMAN PUBLISHING CORPORATION — Simmons-Boardman has opened two new district sales offices, one in Philadelphia and one in Pittsburgh, to provide intensified service to the railway supply industry. The Philadelphia office in charge of *W. E. Glasby,* newly appointed district manager, at Jericho Manor, Jenkintown, telephone: TUrner 7-4526. The Pittsburgh office is in charge of *C. J. Fisher,* newly appointed district manager there, at 530 Sixth avenue, telephone: GRant 1-8186. These and other district sales offices for Railway Locomotives and Cars and its affiliated monthly publications are listed on page 5.

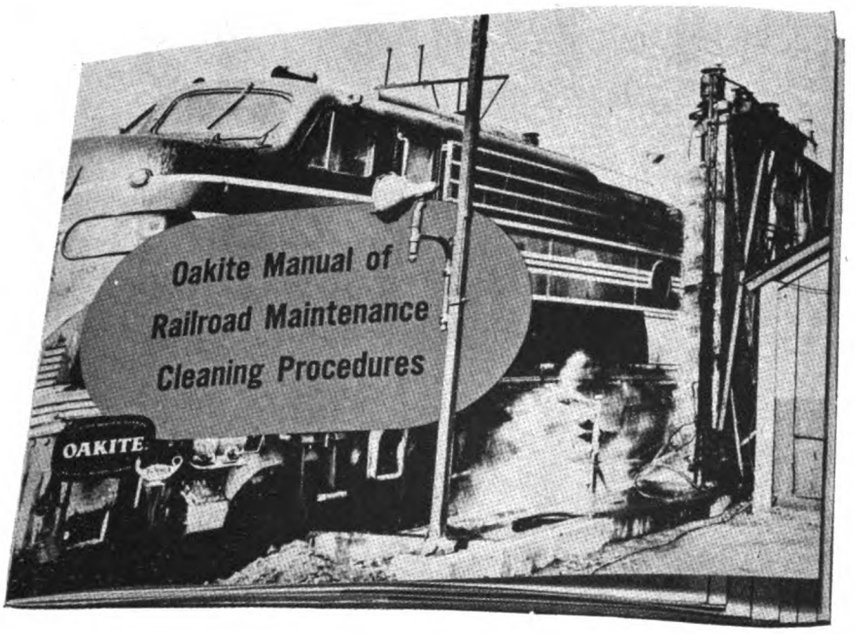
(*Continued on page 94*)

BARBER STABILIZED TRUCKS are easier to service

STANDARD CAR TRUCK COMPANY, 332 S. Michigan Ave., Chicago 4, Illinois.
In Canada: Consolidated Equipment Co., Ltd., Montreal 2.

A Working Guide to

LOW-COST END RESULTS



For *real* railroad cleaning economy you must have *man-hour* economy, too. So look to the speed and thoroughness with which a man cleans when using the best materials . . . and at the *methods* which can save endless hours of work.

This new booklet gives you a good look at eight important groups of jobs where you can profit from Oakite railroad cleaning experience, research done especially for railorads, and high quality materials engineered for specific problems. You'll see valuable information on cleaning exteriors, interiors, running gear and trucks, parts, cooling system maintenance and many more jobs.

Send for this booklet without obligation. Find out why most railroad men rely on Oakite cleaning as the standard for maintenance operations. Write OAKITE PRODUCTS, INC., 46 Rector Street, N. Y. 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE®
MATERIALS · METHODS · SERVICE
SCIENCE

. . . gives you the important advantage
LOW-COST END RESULTS

Export Division Cable Address: Oakite

RAILROAD DIVISION

Supply Trade Notes

(*Continued from page 92*)

R. D. Hitt

S. J. Rejda

AEROQUIP CORPORATION. — *Richard D. Hitt* has been appointed manager, railroad sales, at Jackson, Mich. Mr. Hitt was formerly industrial sales engineer in Pennsylvania.

■

EPOXY COIL CORPORATION.—The Epoxy Coil Corporation, 11510 South Alameda street, Los Angeles 59, has been organized to manufacture and supply a new type of traction motor field and armature insulation. Both new Epoxylite molded coils and maintenance kits, developed to repair vibration-damaged coils without rewinding, will be distributed through the Transcrip Corporation, Chicago. *S. J. Rejda* is president of the new company and *Dr. Henry Lee,* engineering vice-president.

■

AMERICAN BOSCH ARMA CORPORATION.—American Bosch has purchased *Hydramotive Inc.* of Cleveland, Ohio, which company has developed the Hydrotor, a hydraulic starter for all types of diesel and gasoline engines.

■

GOULD-NATIONAL BATTERIES, INC.—*Richard Relf,* Cleveland district manager, has been appointed Detroit regional sales manager, Industrial Division.

■

CONTINENTAL DIAMOND FIBRE OF CANADA LIMITED.—This is the new name of the *Diamond State Fibre Company of Canada Ltd.*

■

FAIRBANKS, MORSE & CO.—*W. B. Morse* has been appointed manager of the Chicago branch. *W. F. Wahlenmaier,* manager of the Portland branch, has been appointed manager of the New Orleans branch, succeeding *Page S. Proctor,* who retires January 1. *Milo C. Roy* succeeds Mr. Wahlenmaier.

■

AIR REDUCTION SALES COMPANY. —*H.C. Wallace,* assistant regional sales manager, Southern Region, has been appointed regional sales manager of that region, with headquarters at Houston, Tex., succeeding *M.G. Wicker,* resigned. *A.W. Gilpin,* has been appointed assistant to the regional sales manager at Houston, and *R. Pringle* succeeds Mr. Gilpin as assistant sales manager.

(*Continued on page 98*)

Books . . . for the railroader

DIESEL-ELECTRIC LOCOMOTIVE HANDBOOK

MECHANICAL EQUIPMENT; ELECTRICAL EQUIPMENT
by George F. McGowan

The basic reference book for enginemen, maintenance men and other railroad personnel concerned with the operation and maintenance of diesel-electric locomotives. An excellent ready-reference. Save time — solve problems — make the job easier.

In Two Convenient Volumes

Electrical Equipment—Complete coverage. Requires no preliminary study of the subject. Explains electrical equipment in diesel-electric locomotives from the ground up. Full descriptions of all major pieces of equipment, their parts, construction, operation, care and repair.

Contents: The Electric Transmission. Electrical Fundamentals. The Electric Generator. The Traction Motor. Exciters, Auxiliary Generators, Motor Blowers, Dynamic Braking. Batteries, Contactors, Electro-Motive Division Electrical Equipment. Alco-General Electric Electrical Equipment. Lima-Hamilton Locomotive Electrical Equipment. Baldwin Locomotive Electrical Equipment. Fairbanks-Morse Electrical Equipment.

xii, 290 pages, 120 illustrations, cloth, $2.75

Mechanical Equipment—Authoritative and clearly written in easy to understand language, this volume covers diesel-electric locomotive construction, design, proper operating methods, "trouble-shooting," and effective servicing and maintenance.

Contents: The Development of the Diesel-Electric Locomotive. Fundamentals. Lubricating and Cooling. Fuel Systems, Fuel. Pistons, Piston Rings, Liners, Connecting Rods, Bearings, Crankshafts. Valves, Timing, Heads, Governors. The Steam Generator. The Air Compressor. The American Locomotive Company Diesel Engine. The Baldwin Locomotive Diesel Engine. The Electro-Motive Diesel Engine. The Fairbanks-Morse Diesel Engine. The Lima-Hamilton Diesel Engine. The Gas-Turbine Locomotive.

xii, 262 pages, 168 illustrations, cloth, $2.75
Two-Volume Set • Only $4.85

DIESEL-ELECTRICS . . . How to Keep 'Em Rolling

This important book explains the electrical fundamentals of all makes, all types of diesel-electric locomotives in plain, non-technical language easily understood by any practical shop or maintenance man.

The 24 chapters are the work of eleven specialists and are edited by A. G. Oehler, electrical editor of *Railway Locomotives and Cars*, where they appeared over a period of more than two years. This is the first time the entire series has been assembled in one book, complete with full illustrations, both diagrams and photographs.

It is a valuable source of electrical knowledge which will be found useful to anyone in railroad service who has to do with diesel-electric locomotives.

1954. 139 pages 217 illus. 8½ x 11. Paper. $2.50

ANALYSIS OF RAILROAD OPERATIONS

by Joseph L. White

Only a few copies left of this standard treatment of railroad operation. Guides the reader through the intricacies of railroad accounting and shows how to analyze accounting and statistical statements covering operations data.

1946 2nd ed., 306 pp., charts, tables, $3.00

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30 Church Street, New York 7, New York
Please send the following:

- ☐ Diesel-Electric Locomotive Handbook 2 volume set $4.85
- ☐ Electrical Equipment volume only, $2.75
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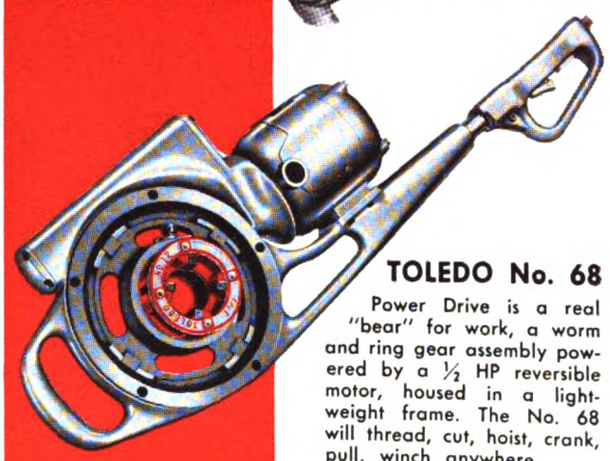
MAKING NEWS wherever used . . .

TOLEDO No. 78

Power Drive takes the toil out of threading, reaming or cutting. Put ½" to 2" pipe in the wrenchless chuck, finger tighten, turn the switch. With a TOLEDO Drop Head Ratchet Threader, your threading jobs are turned out in seconds!



TOLEDO No. 68

Power Drive is a real "bear" for work, a worm and ring gear assembly powered by a ½ HP reversible motor, housed in a lightweight frame. The No. 68 will thread, cut, hoist, crank, pull, winch anywhere. (Weighs only 33 lb.)

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES

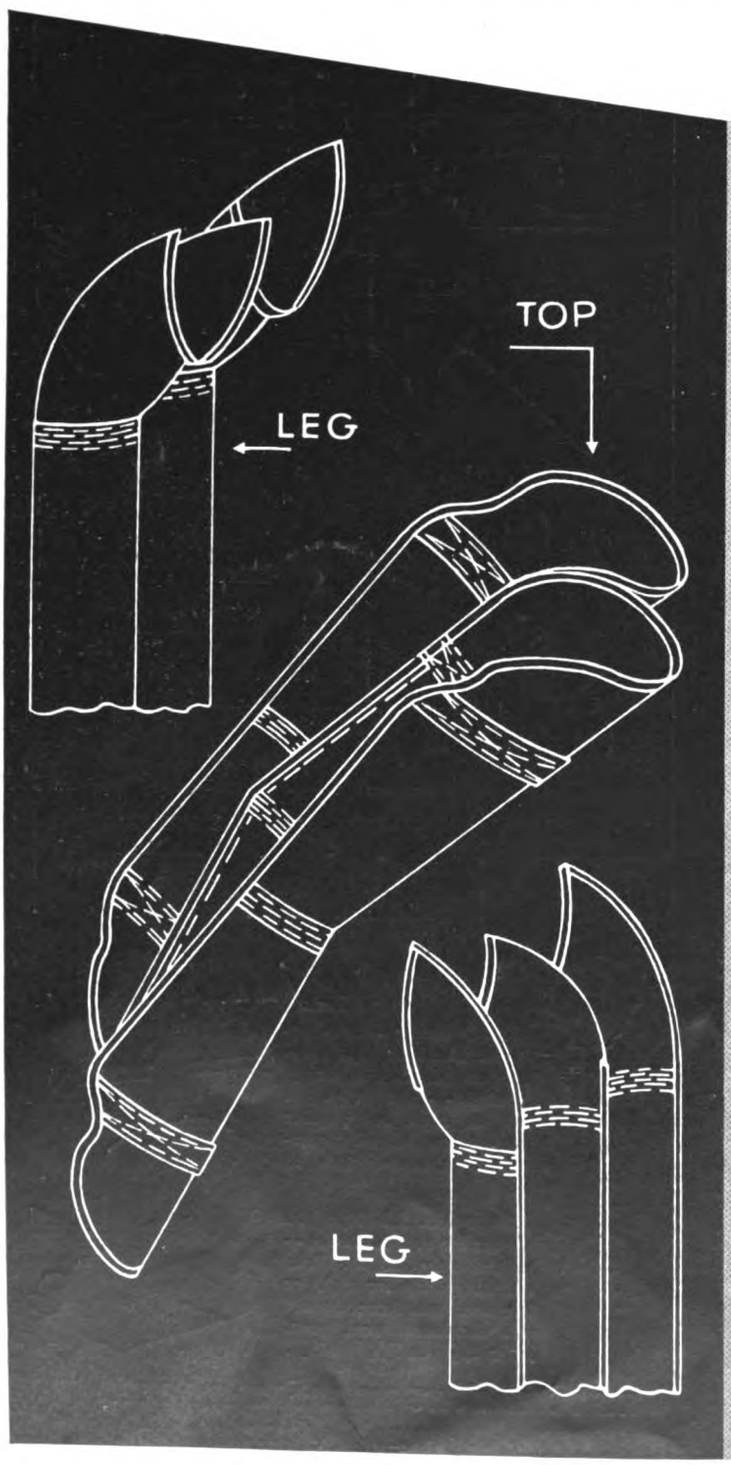
Quality Checked

TOLEDO Heavy Duty **drop-forged** aluminum pipe wrenches are virtually as strong as steel - - but weigh just half as much! All popular sizes. Unconditionally guaranteed, absolutely safe to use.

Toledo No. 22 Pipe Vise is built for rugged service - - weighs only 12 lb. Yoke mounts quickly for right or left hand use. Acme threads and hardened steel jaws. ⅛" to 2½" and ⅛" to 4½".

THE TOLEDO PIPE THREADING MACHINE CO.
TOLEDO 4, OHIO

for longer life... less maintenance!



Install Adlake Diaphragms!

Top and Legs Are Separate Units! Gives flexibility for longer life—prevents tearing at corners.

Replaceable Sections! Replace damaged sections only—not the whole diaphragm.

Sloping Top Drains Water! Rain, snow, dirt, carry off quickly, moisture doesn't collect.

New Belting Treatment! Fibers last much longer, and resist car-washing detergents. Aluminum finish for new-type cars.

Cleaner Vestibules! Snow, rain, dirt stay out; new boot completely covers space between diaphragm and toe plate.

For the full story on Adlake diaphragms, write The Adams & Westlake Company, 1152 N. Michigan, Elkhart, Ind.

THE
Adams & Westlake
COMPANY

Established 1857

New York • ELKHART, INDIANA • Chicago

Manufacturers of Adlake Specialties and Equipment for the Railroad Industry

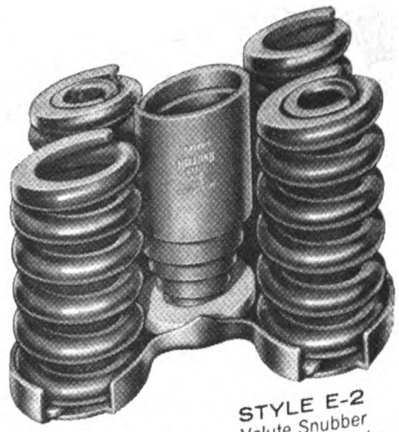
Adlake — THE ADAMS & WESTLAKE CO. — 100th ANNIVERSARY 1857-1957

HOLLAND VOLUTE SNUBBER SPRINGS

Upgrades ride by introducing an unusually smooth snubbing action with an exceptionally high load carrying capacity. Holland's principle of utilizing the sliding action of telescoping radially compressed coils eliminates the "wedging" problem.

HOLLAND
Volute Snubber Springs, Either 1⅜" or 2½" Spring Travel

2½" 1⅜"

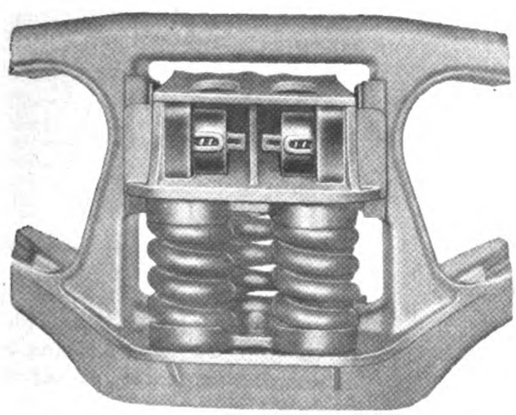


STYLE E-2
Volute Snubber Spring, 2½" Travel—in 50-Ton Group

HOLLAND

for the finest in Freight Car Truck Controls

Modern high speed freight service is continuously increasing the importance of Holland's pioneering efforts and engineering accomplishments in the field of ride control. Whether for the **upgrading of existing trucks** . . . or for new trucks embodying the finest in proven control principles . . . Holland has answers that will increase safety and reduce to a minimum costly damage to equipment, lading and track. For complete information, write for Holland Bulletins, Holland Company, 332 South Michigan Ave., Chicago 4, Illinois.



HOLLAND BOLSTER CONTROL UNIT STYLE RS-2

An advance over all existing devices for upgrading freight car trucks to provide new truck riding qualities at a saving over new truck cost of 80%! A significant advance over the spring "package" method; utilizes the Holland principle of direct action, axially loaded members.

HOLLAND RIDE EASE TRUCK STYLE RE-2

Introduces a new, yet thoroughly proven built-in bolster spring control following the same basic principle of direct acting, axially loaded friction members so successfully employed in the Holland Ride Stabilizer unit RS-1 for finest 3 way control . . . viz.: vertical, lateral and longitudinal.

198-R

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SHORTCUTS to better commutator maintenance

QUALITY-BUILT TO DO THE JOB RIGHT! . . .

The easiest way to restore commutators in traction motors and generators without dismantling during interim maintenance...or during periodic overhauls. IDEAL Resurfacers and other tools are used by leading railroads and recommended by locomotive builders.

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Refinish commutators to like new condition even when ridged, scored or burned. Wood block handles clamp rigidly into grinder. Seven sizes, in all grades from extra coarse to extra polish.

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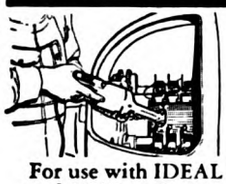

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Supply Trade Notes

(*Continued from page 94*)

THOR POWER TOOL COMPANY.—*James P. Stine,* East Coast zone manager, has been promoted to manager of the New York branch, succeeding *W. J. McGraw,* recently named manager of Thor's electric tool division. *A. V. Moroz* has been appointed electric tool sales manager, Chicago branch, succeeding *Arthur H. Nelson,* retired.

■

WAUKESHA MOTOR COMPANY.—*Newton H. Willis,* recently named a vice-president, has been placed in charge of the company's engineering activities. He will continue to direct the railway division.

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

BATTERIES. Revised 44-page "Battery Users Manual" describes complete scope of motive-power battery maintenance and repair. Specially designed for conducting organized battery in-plant training courses. Includes illustrations, diagrams, and tables on battery theory and construction, battery selection, battery testing and techniques, etc. (Write: *Gould-National Batteries, Inc.,* Dept. RLC, Trenton 7, N. J.)

HYDRAULIC CRANE. 4-page Gould Report No. 5609 discusses use and cost of operating A-W hydraulic three-in-one crane in a Pullman-Standard car-building plant. (Write: *Austin-Western Works, Baldwin-Lima-Hamilton,* Dept. RLC, Aurora, Ill.)

CYLINDRICAL GRINDERS. 24-page catalog J-57 describes Landis 14-in.-18-in. type CH universal prevision cylindrical grinders. Includes specifications. (Write: *Landis Tool Company,* Dept. RLC, Waynesboro, Pa.

STRUCTURAL STEEL. 20-page booklet describes Super-Strength Structural Steels having minimum yield strengths from 55,000 to 150,000 psi. Reviews 15 different grades of steel produced by seven different companies. Contains technical information and numerous tables describing composition, mechanical properties, heat treatment, corrosion resistance, machinability, size limitations and end uses of these materials. (Write: *Climax Molybdenum Company, Metallurgical Development Division,* Dept. RLC, 500 Fifth ave., New York 36.)

ELECTRODE GUIDE. 70-page Electrode Pocket Guide (ADC 650G) con-

(*Continued on page 100*)

Take a tip from LEADING RAILROADS—

SPEED UP DRILLING and TAPPING

WITH ERRINGTON

Adjustable Multiple TAPPING and DRILLING HEADS

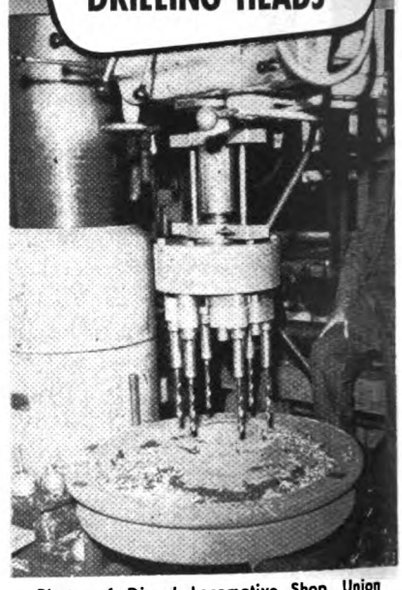

Photo of Diesel Locomotive Shop, Union Pacific R. R., shows Errington Multiple Drill holding six drills—(can also use six tap tools)—drilling passenger car wheel, to make-ready for attaching new style wheel brakes.

Here are versatile tools which permit you to take advantage of a wide range of adjustment—without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Features: Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case. All parts fully enclosed for pressure lubrication and protection. Non-slip positive clamping on all adjusting members.

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—cut flange down when needed, keeps wheel in perfect operating condition. Keeps engine rolling.

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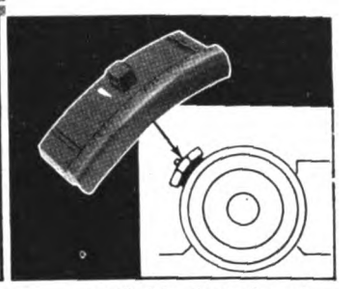

—applied in place of regular brake shoe, grinds the wheel slowly, accurately, economically. Provides more efficient driving wheel contact.

For your best wheel maintenance, whether it is a flange cutter or a wheel abrasive shoe, be sure it is a "Wheel Truing Brake Shoe", designed especially to meet your needs. Write today for full information.

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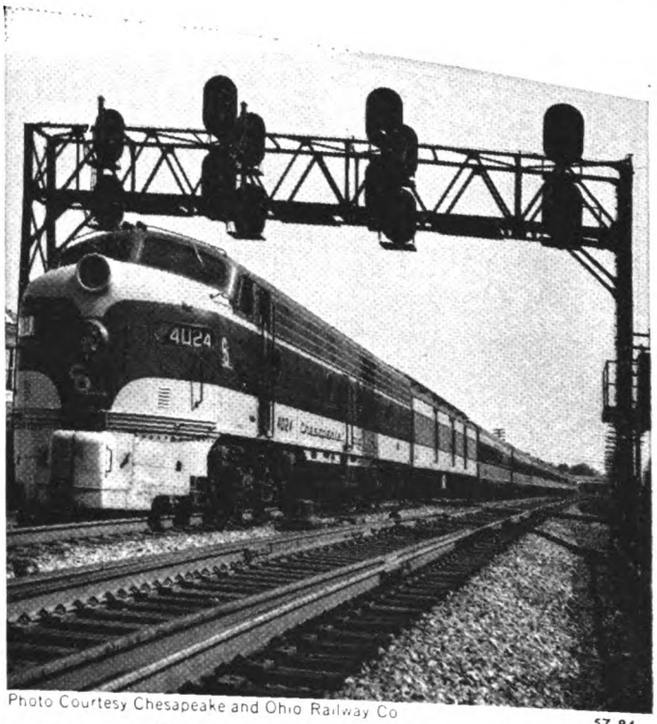

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57-84

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Install them, then forget them for many extra miles of rough and rugged travel . . . over 200 U. S. and Canadian railroads do just that by installing Ex-Cell-O Pins and Bushings. Often get up to a million miles of trouble-free service.

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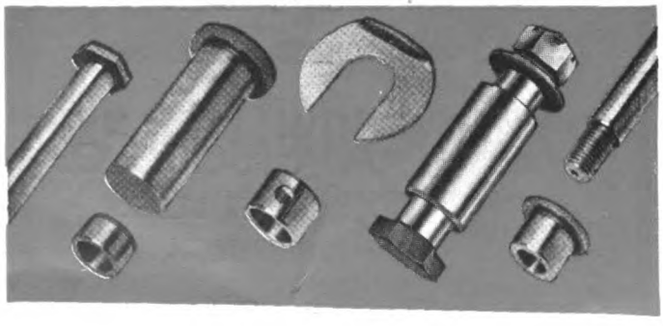

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- **Canadian Pacific, Norfolk & Western, New York Central, Illinois Central, Canadian National, Santa Fe, Southern and Union Pacific are a few of the progressive roads now using these sets.**

THREE BIG ADVANTAGES OF DC TESTING:

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Helps From Manufacturers

(*Continued from page 98*)

tains information essential when buying or using electrodes. Electrode consumption calculator, tabulates data for calculating consumption per linear foot in the welding of various types of joints. Describes each Airco electrode, its color code, application, and best procedure for its use in welding, and explores weld-metal chemical analyses and mechanical properties. Factors which determine electrode selection, industrial and government specifications for filler metals, and testing of deposited weld metal also discussed. (Write: *Air Reduction Sales Company, a division of Air Reduction Company*, Dept. RLC, 150 East 42nd st., New York 17.)

HYDRAULIC PRESSES. Bulletin 1015 gives full description and specifications of Elmes hydraulic C-frame presses for forcing, straightening, bending, forming, and similar operations. Describes outstanding features, including extra-rigid main press frame designed to meet NMTBA minimum deflection specifications; press ram of semi-steel fitted at head end with step-seal piston rings; simplified hydraulic circuit utilizing a minimum amount of high-pressure piping; easily removable pumping unit; operation by hand lever or optional foot pedal control. (Write: *Elmes Engineering Division, American Steel Foundries*, Dept. RLC, 15 Tennessee ave., Cincinnati 29.)

TRANSPORTATION FINISHES. 4 page bulletin contains data on finishes available for mechanical, diesel and car, maintenance of way, bridge and building and signal department applications. Color cards of the products described available on request. (Write: *McDougall-Butler Co.*, Dept. RLC, 2929 Main st, Buffalo 14.)

CARBON BRUSH PERFORMANCE. 8-page booklet, GEA-6688, contains questions and answers covering brush life, metal transfer, commutator threading, bar marking and commutator adjustment. (Write: *General Electric Company*, Dept. RLC, Schenectady 5.)

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RAILWAY LOCOMOTIVES AND CARS

published monthly at Philadelphia, Pa. for November, 1957.

1. The names and addresses of the publishers, editors, managing editor, and business manager are:

Publisher, Robert G. Lewis, 30 Church St., New York 7, N. Y.

Editor, Harold C. Wilcox, 30 Church St., New York 7, N. Y.

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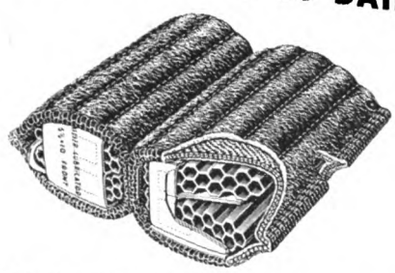

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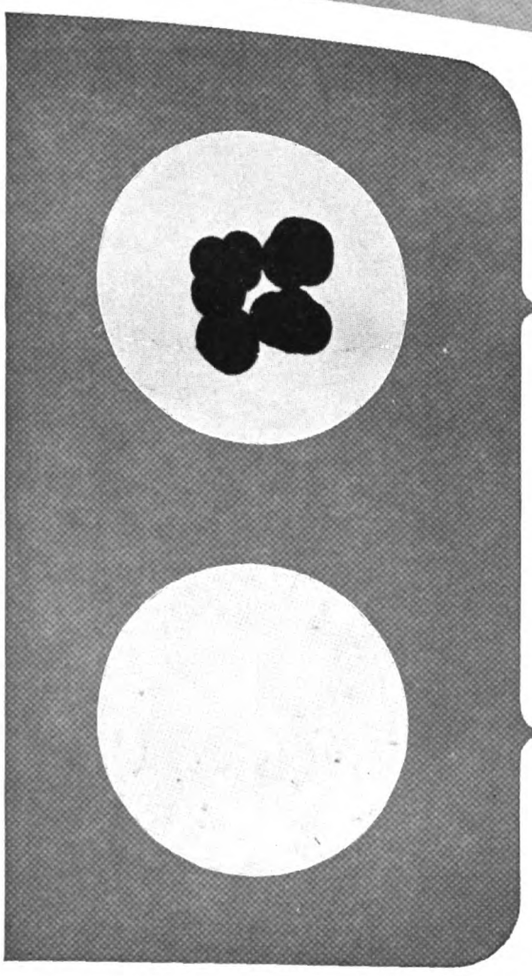
A quick look at what 1 pint of Nalco Treatment to 1,000 gallons of Diesel Fuel Oil



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lower-cost fuel oil sample, magnified 8400X, contains sludge particles that foul filters, stick injectors, cut combustion efficiency, and contribute to excessive smoking and sparking.

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by Nalco, same fuel oil at 8400X magnification, shows sludge particles dispersed as though dynamited . . . and these particles stay dispersed for clean combustion in sludge-free equipment.

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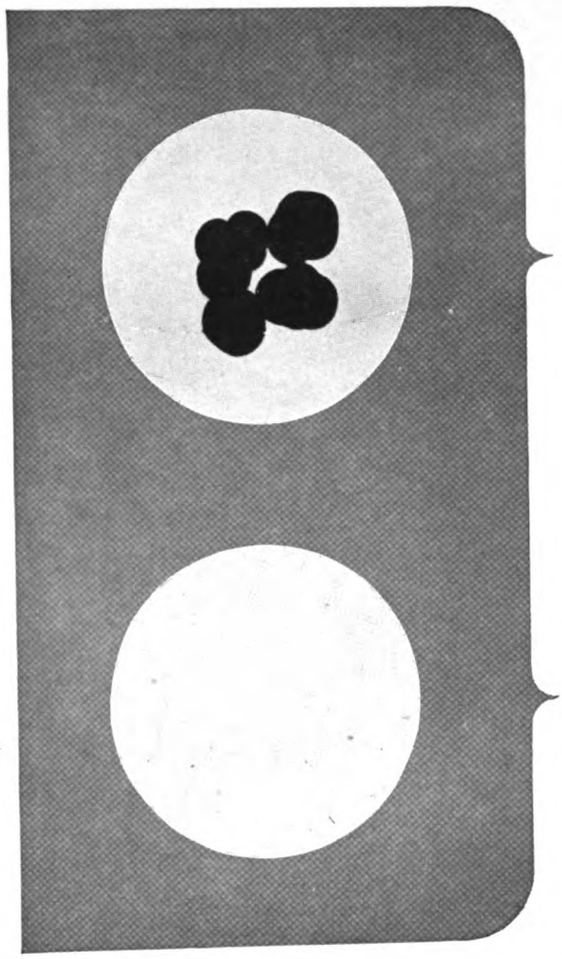
A quick look at what 1 pint of **Nalco** *Treatment does to 1,000 gallons of Diesel Fuel Oil*



UNTREATED
lower-cost fuel oil sample, magnified 8400X, contains sludge particles that foul filters, stick injectors, cut combustion efficiency, and contribute to excessive smoking and sparking.

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by Nalco, same fuel oil at 8400X magnification, shows sludge particles dispersed as though dynamited . . . and these particles stay dispersed for clean combustion in sludge-free equipment.

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Average 66,000,000 car-miles per hot box compared to 189,000 for friction bearings

To help America's railroads measure bearing performance, we've been keeping records since 1945 for every freight car equipped with Timken® tapered roller bearings. These records show that Timken bearings have gone a total of 929,645,000 car-miles with only 14 cases of overheating.

In other words, Timken bearings have averaged 66,000,000 car-miles between overheated bearings—proving by their performance that they eliminate the hot box problem.

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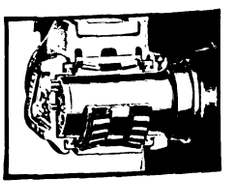
To find out more, send for our free booklet, "How 'Roller Freight' Can Save America's Railroads $224,000,000 A Year." The Timken Roller Bearing Company, Canton 6, Ohio. Canadian Plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



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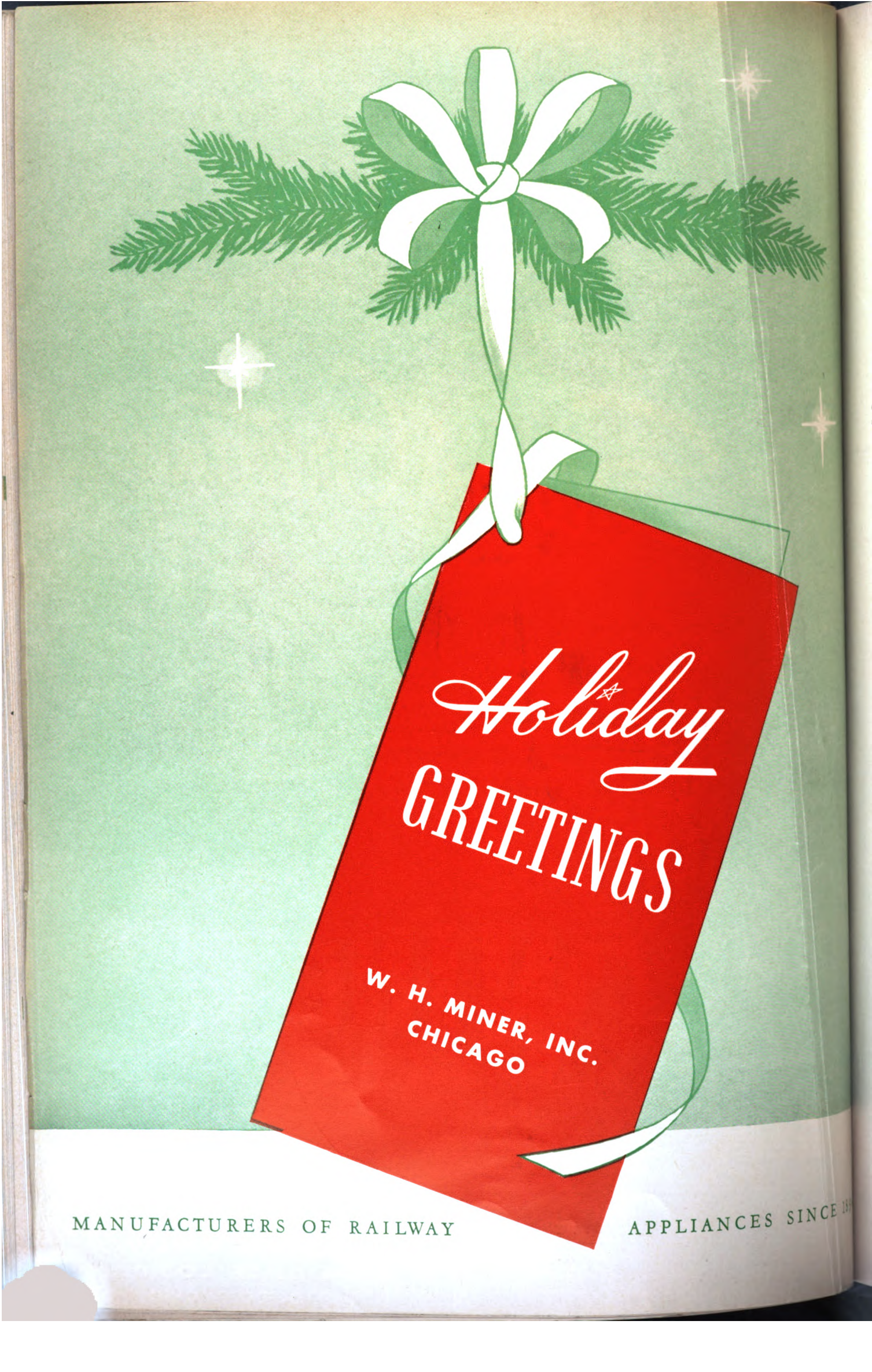


MANUFACTURERS OF RAILWAY APPLIANCES SINCE 18

20-year overhaul of Reading "Crusader" proves...

beauty of stainless steel is more than skin deep

In 1937 the Reading Railroad put the all-stainless steel "Crusader" in service on the New York to Philadelphia run.

This April, twenty years and almost two million miles later, they brought the "Crusader" in for its third complete overhaul. The condition of its stainless steel completely justified the confidence shared by the Reading and the Budd Company, the "Crusader's" builders, in nickel-containing stainless as a highly practical material for railroad car construction.

Condition shows it's inexpensive, too

In the photos above, taken during overhaul, you can see for yourself the excellent condition of the "Crusader's" stainless steel exterior skin and structural members.

No scale. No corroded parts to be replaced. Accumulated dust under the sheathing was easily removed by scraping. Sheathing itself was restored to original condition merely by wiping. With only this minor maintenance, the "Crusader's" stainless steel looks – and is – as good as new, as modern as tomorrow!

There's more to stainless steel than meets the eye

In addition to such permanent resistance to corrosion, and lasting good appearance, stainless steel has a high strength-to-weight ratio. Permits lighter cars, important savings in fuel costs. And builders find that its ductility and weldability permit fast, simple fabricating methods . . . economical production.

"Nickel Alloys in Railroad Equipment," a 32-PAGE BOOKLET, describes how nickel-containing stainless steels and other nickel alloys can lower operating and production costs and improve safety factors in rolling stock, locomotives and trackwork. For your copy, just write Inco.

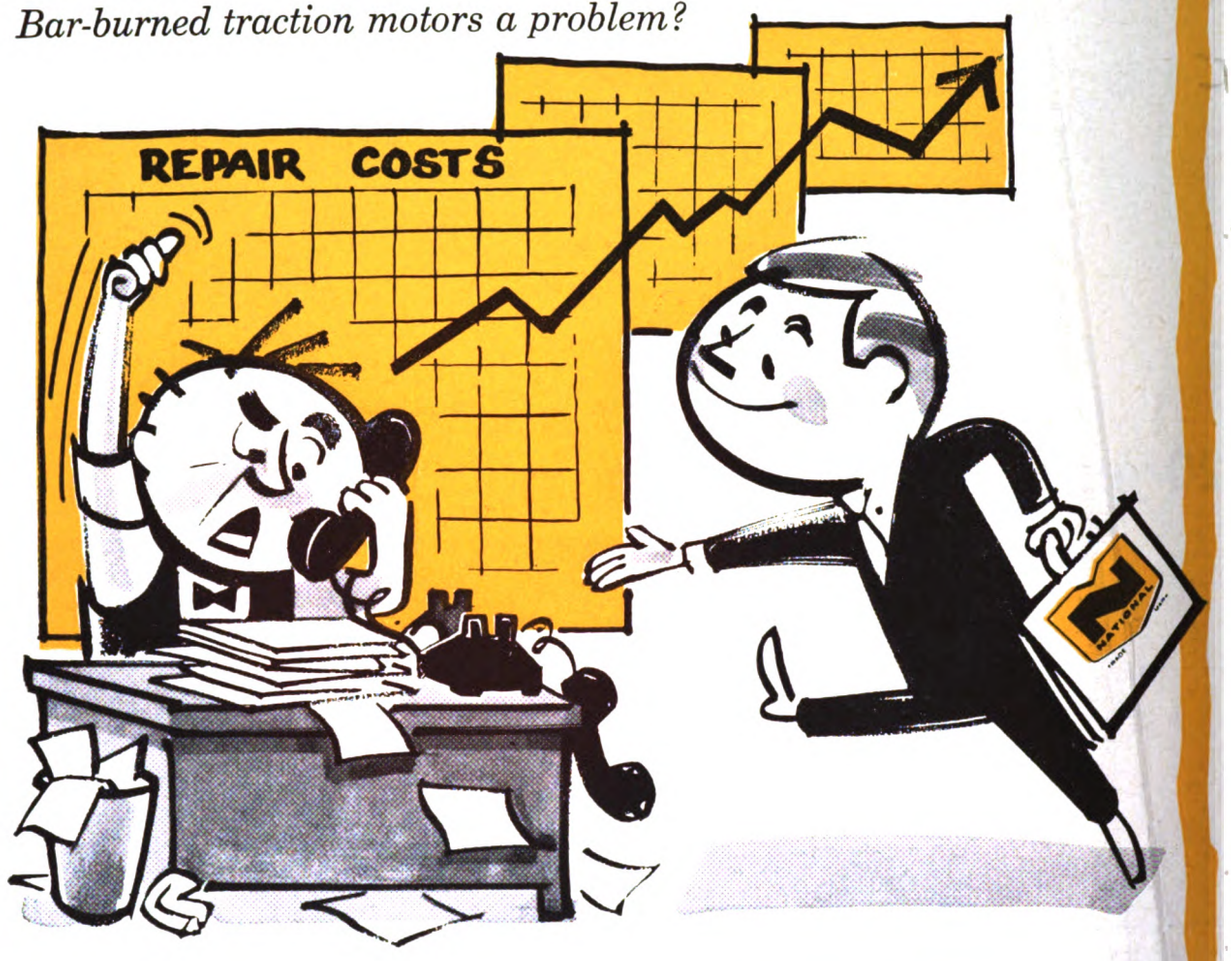
The International Nickel Company, Inc.

67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL ALLOYS PERFORM BETTER LONGER

Bar-burned traction motors a problem?



Here's how your NATIONAL TRADE-MARK brush man helped one road slash reconditioning costs

MURPH VARNEY

At least 70 traction motors a year — laid up because of premature commutator bar burning. That was the problem "National" Carbon Brush Man Murph Varney found on a leading mid-west road. Amazingly, the road felt that resulting down time, parts and labor costs were the unavoidable price of high speed passenger operation.

Murph proved differently by analyzing this road's problem and recommending the right "National" carbon brush to alleviate bar burning. Result: premature removal of traction motors fell *from 70 to 5 a year.*

Murph Varney and his fellow "National" Carbon Brush Men have been solving railroad brush problems for years. Their experience and training — backed by "National" *long term brush development* — make them the logical consultants on any railroad brush application.

Call them today or write National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

UNION CARBIDE

The terms "National", "N" and Shield Device, and "Union Carbide" are registered trade-marks of Union Carbide Corporation

NATIONAL CARBON COMPANY • Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N. Y.

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TIME-SAVING IDEAS FOR **DECEMBER 1957**

Volume 131 • No. 12

MOTIVE POWER AND CAR

C&NW Concentrates at Clinton 27

Big step in renovation of this hard-pressed railroad has been elimination of 14 separate car repair operations by construction of the new shop at Clinton, Iowa.

Monon Designs New Trailer Hitch 30

Piggy-back loading has been simplified with the new trailer hitch already installed on one-fourth of this railroad's "Trailer Maid" flat car fleet.

Pennsy Installs First Aluminum Box Car Doors 32

Lighter weight and corrosion resistance are but two of the advantages claimed for these Kaiser car doors which are already on Pennsy box cars.

Fumigation—Solution to Low-Grade Fuel Use? 33

New possibilities in the combustion of low-grade fuel oils on diesel locomotives were revealed last month to the Society of Automotive Engineers.

Transit Cars Outperform Previous Designs 34

Air-spring suspension and new high-capacity motors on Boston rapid transit cars increase passenger comfort and open up new scheduling possibilities.

Cleaning Road Locomotive Windshields 36

Streamlined noses of all builders' road diesels are not too easily reached from ground. Getting there and what to do then are this month's problems.

ELECTRICAL

Glass Tape for Armature Banding 38

The development of glass tape with parallel fibers in polymerizing resin may eliminate the need for steel banding wire.

Remember Number 5 39

If the engine insists on stopping in the No. 5 position, there are just three reasons for it.

How Does Environment Affect Brush Operation? 40

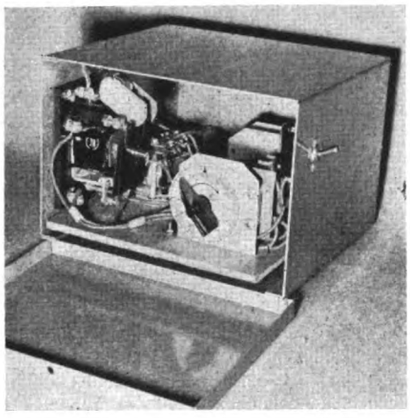
Factors which influence commutator film have much influence on commutation.

Roll Them Out Like New—Part 5 41

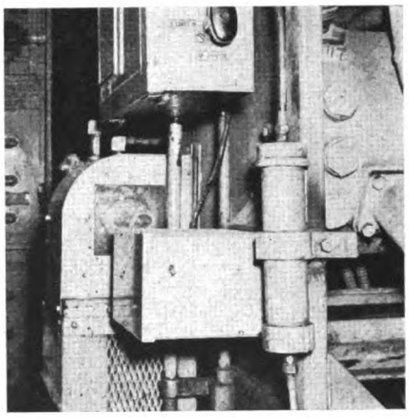
Electrical cleaning procedures from bucket and brush to vapor degreasers are compared in this chapter.

DEPARTMENTS

What's New in Equipment	6	Supply Trade Notes	16
Report	10	Problem Page	36
Personal Mention	14	Helps from Manufacturers	66



Saver showing clock control.



Saver mounted on locomotive.

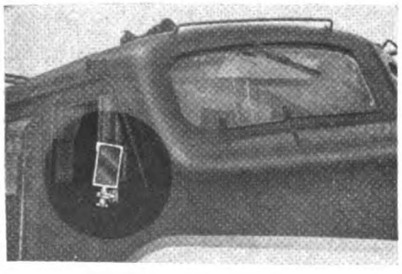
Warm Engines with Less Fuel

The La-Over Fuel Saver is a device for controlling diesel engine temperature during locomotive stand-by or layover periods. The diesel engine is automatically stopped and started in response to a precision time cycle and engine temperature control. The manufacturer states that fuel costs are reduced by eliminating long periods of engine idling and that cold idling is reduced to a minimum, decreasing engine wear.

The device functions to shut down the diesel engine for 40 min of each hour of layover. At the expiration of 40 min, the engine is automatically started. After 20 min of operation, the engine will automatically shut down for another 40 min. This cycle continues until the locomotive is taken out for train service.

A thermostatic feature provides additional temperature control by automatically starting the engine, if the cooling water temperature falls below a predetermined value during the down portion of the cycle. The engine runs until temperature is restored. Then, control of the engine is returned to the "timer".

The equipment is in a metal box which measures 7 in. by 10 in. by 8 in. and weighs 15 lb. *Ajax-Consolidated Company, Dept. RLC, 4615 W. 20th st., Chicago 50.*



Rear-view Mirror

The Adjust-A-View mirror, model No. 06X, fits all classes of locomotives on both sides. According to the manufacturer, the engineman can adjust the mirror without the aid of a mechanic. Once locked into position, it is said not to vibrate because of wind or train movement, allowing a clear view of entire train.

An aluminum alloy frame is used with a ¼-in. shatter-proof plate-glass mirror, protected by a plastic U-channel in frame. In case of breakage, mirror is replaced by removing the top of frame and two screws. The sealed-in, mirror surface has an area of 4¼-in. by 7¾-in., with 360 deg adjustment both ways.

The clevis, bracket, and handle are malleable iron, cadmium plated. *Transport Products Corporation, Dept. RLC,* 3008 *Magazine st., Louisville 11, Ky.*

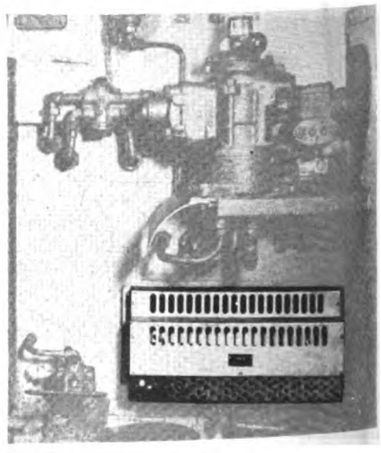
Disposable Paper Wipers

For greater safety and reduced maintenance wiping costs, disposable paper wipers have been adopted for diesel repair operations at the main shop of the St. Louis-San Francisco in Springfield, Mo., and the Lindenwood shops in St. Louis. Cloths formerly used created a hazard, both from safety and performance standpoints, and were being used beyond their saturation points. In many instances more dirt was "wiped on" repaired parts than "wiped off." The wipers also frequently contained needles, pins, and other metal pieces that caused cuts and scratches when used for personal wiping.

In the mechanical department, paper wipers now help remove dirt from component parts, such as oil throwers and bearing caps of traction motor bearings; wheels that are regreased, etc. Perf-embossed surfaces of Scott wipers provide hundreds of tiny pockets that soak up oil and penetrate greasy deposits. Solvents may also be used with the wipers to help loosen and remove oily films.

In the electrical department stripped down equipment, such as motor converters for steam generators, armatures, motor stators, etc., are cleaned with paper wipers. Throughout the shops paper wipers are also available from self-dispensing cartons for employee use.

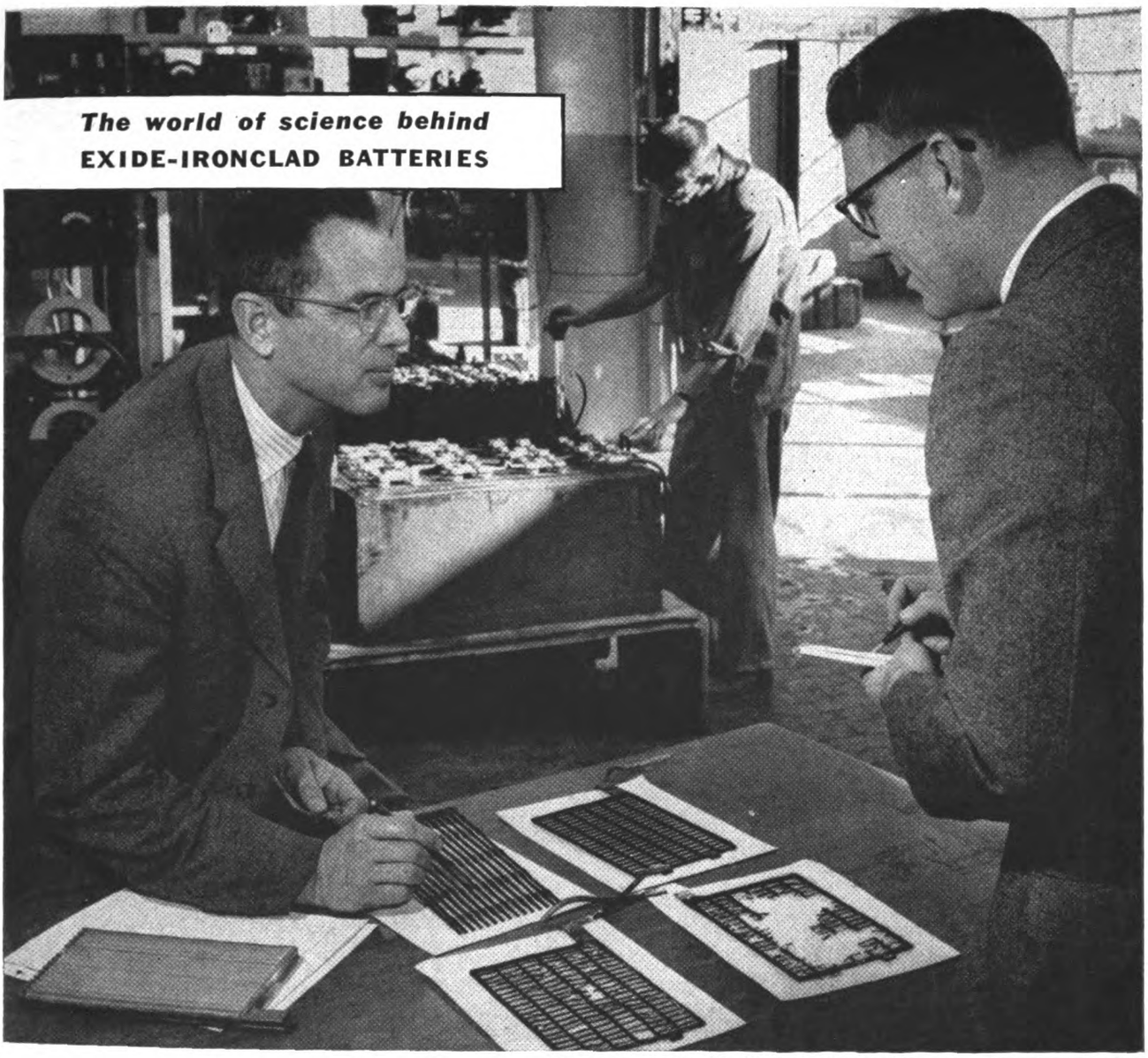
The paper wipers cost a fraction of a cent apiece as compared with 18 cents a pound for the cloth wipers, plus laundry costs which have also been eliminated through the use of the disposable paper wipers. *Scott Paper Company, Dept. RLC, Chester, Pa.*



Heater for Locomotive Cabs

The Convectair electric heater provides heat in a locomotive without itself reaching a high temperature. Due to the design of the unit a large amount of air

(Continued on page 24)



Being interviewed is W. W. Smith, Divisional Manager, Product Engineering. Grids in back are of Exide's exclusive Silvium. Those in front are ordinary alloys.

"All of these alloys had the same acid test"

At the Exide Laboratories—**Reporter:** Was it a typical charge-discharge test normally used to test battery components?

Smith: Right. And the two positive plate grids with no visible signs of corrosion are Exide's patented Silvium alloy.

Reporter: How about the others—what alloys are they?

Smith: They're standard alloys used in other well-known makes of batteries. But they don't have Silvium's corrosion-resisting ingredients.

Reporter: Where is Silvium used?

Smith: In the positive plates of all Exide-Ironclad and many other Exide Batteries.

Reporter: How does it affect battery performance?

Smith: Every test we've made proves it stretches battery life because the grid resists corrosion—sometimes up to 100% longer.

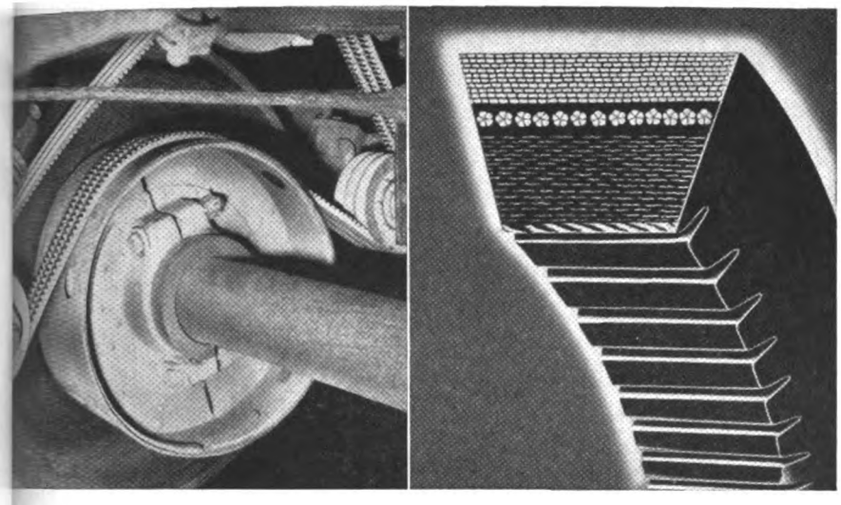
Reporter: Obviously this is an important feature of the Exide-Ironclad.

Smith: Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

L & N Railroad Uses Dayton Cog-Belt* Drives fo



For low initial cost, easy installation, and least maintenance, specify dependable Dayton endless Cog-Belt Drives on your caboose installations.

87 Caboose Generators

Additional 49 drives being installed to complete modernization

Since 1954, the Louisville and Nashville Railroad has equipped a total of 87 of its cabooses with two-way radio telephones. The generator is driven, in each case, by a Dayton Cog-Belt* Axle Drive.

In the present phase of this extensive modernization program, 49 more L&N Cabooses are being radio equipped. And again, Dayton undercar drives are being used on each piece of equipment.

This is another example of Dayton's excellent record of trouble-free service on railroads everywhere, a factor important to every Railway Electrical Engineer who specifies undercar drives.

Trouble-free Dayton Cog-Belts are specially built . . . making them tough enough to stand up for years in any type of railroad service . . . air conditioning, diesel locomotives or caboose drives. Dayton Railway Endless Cog-Belts will, size for size, transmit more horsepower than any other V-Belt made.

The proof is in the experience of this railroad and the many other roads in every part of the nation that have been using Dayton V-Belts with marked success over the last 25 years. For technical assistance with any type of undercar drive, call your Dayton representative, or write The Dayton Rubber Co., Railway Division, Dayton 1, Ohio.

D. R. 1957

*T.M.

Dayton Rubber

World's Largest Manufacturer of V-Belts

Specialized Railway Representatives in Atlanta, Chicago, Cleveland, Dallas, Dayton, Moline, New York, San Francisco and St. Louis

LOCOMOTIVES AND CARS REPORT FOR NOVEMBER

Orders and Inquiries for New Equipment

Placed Since the Closing of the November Issue

Diesel-Electric Locomotive Orders

Road and builder	No. of units	Horse-power	Service	Other detail
NORTHERN PACIFIC:				
Electro-Motive	15	1,200	Switchers	30 units for delivery first half 1958. Road contemplates placing orders later this year for similar number of units for second half delivery.
	13	1,750	Road switchers	
Alco Products	2	1,800	Road switchers	
NEW YORK, CHICAGO & ST. LOUIS:				
Electro-Motive	20	1,750	Road switchers	40 units for delivery in February-March.
Alco Products	10	1,800	Road switchers	
Fairbanks, Morse	10	1,200	Yard switchers	

Freight-Car Orders

Road and builder	No. of cars	Type of car	Cap., tons	Other detail
BANGOR & AROOSTOOK:				
Magor Car	150	Pulpwood	—	End rack, roller-bearing equipped. Approximate cost, $1,580,000. Delivery early next summer.
CHICAGO & NORTH WESTERN:				
Pullman-Standard	275	Covered hopper	70	For January delivery.
	200	Gondola	70	Mill type. For March delivery.
LONG ISLAND:				
International Ry. Car	6	Cabooses	—	For March delivery. Total cost, $82,050. Will have neither bay windows nor cupolos, but will have two walk-over passenger-type seats inside at windows.
MINNEAPOLIS & ST. LOUIS:				
Pullman-Standard	50	Covered hopper	—	For April delivery.
	2	Box	—	With Evans DF equipment. For January delivery.
NORFOLK & WESTERN:				
Company shops	1,500	Hopper	70	For late 1958 delivery.
UNION PACIFIC:				
Pullman-Standard	525	Box	50	———
WILSON CAR LINES:				
Pacific Car & Fdry.	200	Refrigerator	40	Unit cost, $14,000. For delivery first quarter 1958.

Passenger-Car Orders

Road	No. of cars	Type of car	Other detail
CHICAGO & NORTH WESTERN:			
Pullman-Standard	10	Coaches	13 cars to be of "bi-level" design. Cost, $2,500,000. Delivery scheduled for next summer.
	1	Parlor car	
	1	Coach-parlor	
	1	Coach-bar-lounge	

Inquiries and Notes

FREIGHT CARS:

Minneapolis & St. Louis—Will soon begin installation of Evans DF equipment at its Marshalltown, Iowa, shops.

Louisville & Nashville—Will install roller bearings on 230 passenger-train cars, including 120 baggage cars, 30 combination baggage-mail cars, and 30 coaches, at its South Louisville, Ky., shops at a unit cost of approximately $3,000.

Train Performance Studies Made in Minutes

By means of digital computers, now owned by a number of railroads, locomotive tonnage ratings and the performance of a train of given consist over a section of railroad can be quickly predetermined. This includes grade, curvature, speed restrictions and other operating conditions. Tonnage rating calculations on the digital computer require from one to five minutes per locomotive group, depending on the length of track involved and the degree of accuracy desired.

The manner in which this may be done will be described in a paper by J. E. Hogan, Pennsylvania Railroad, to be presented before the Land Transportation Committee at the Mid-Winter Meeting of the American Institute of Electrical Engineers, to be held in the Hotel Statler, New York, February 2-7, 1958.

No Atomic Locomotive

"There have been many discussions of the nuclear locomotive. I think such a machine is a most ingenious solution of the question how to combine minimum utility with maximum danger. Trains in the atomic age will no doubt be electric."

The foregoing is a quotation from an article "Atomic Energy in the Year 2,000," by Dr. Edward Teller, which appears in the Fall 1957 issue of The Lamp, published by the Standard Oil Company of New Jersey. Dr. Teller is a noted physicist and has sometimes been called the father of the hydrogen bomb.

Miscellaneous Publications

MECHANICAL RESEARCH REPORT MR-271—Survey Covering Various Types of Fuels Used in Diesel Locomotives, dated September 1956. Report based on information compiled from questionnaires sent to 33 selected representative railroads. *Fred Peronto, secretary, Mechanical Division, Association of American Railroads, 59 East Van Buren st., Chicago 5. Price: Members 75 cents; others $1.50.*

MECHANICAL RESEARCH REPORT MR-290—Economic Analysis of Overheated Journals, dated July 1957. Covers analysis of 1,344 axles which had overheated journals and makes an evaluation of cost required if certain revised methods of handling were to be adopted. *Fred Peronto, secretary, Mechanical Division, Association of American Railroads, 59 East Van Buren st., Chicago 5. Price: Members, $1.50; others, $3.*

(Turn to page 14)

Summary of Monthly Hot Box Reports

Month	Cars set off between terminals with Hot Boxes: System	Foreign	Miles per car set off
August 1953	8,638	14,160	130,319
August 1954	7,568	9,742	155,756
1955			
August	8,555	14,358	128,941
September	5,896	10,469	178,649
October	3,966	7,182	271,364
November	2,010	3,972	493,184
December	1,819	3,774	522,444
1956			
January	2,029	4,302	462,029
February	2,570	5,611	341,542
March	2,517	6,212	346,853
April	3,202	6,881	290,626
May	4,672	10,903	196,688
June	6,777	15,125	135,774
July	8,484	16,067	113,573
August	9,891	16,892	113,474
September	6,834	12,629	149,970
October	4,357	8,429	243,505
November	2,650	5,560	359,759
December	2,256	4,436	438,425
1957			
January	3,373	6,121	291,453
February	3,272	6,844	264,538
March	3,164	6,687	307,306
April	3,949	8,447	228,493
May	6,580	12,691	154,387
June	8,285	16,277	115,749
July	10,438	18,819	96,064
August	9,662	17,639	109,839

Check list for a customer: to measure a supplier's dependability in the future

During the past six months we have discussed *responsibility* as the basis of selecting a supplier.

We covered *price* in relation to rising material costs. We discussed *delivery* and gave examples of "responsible delivery." We showed that delivery becomes *customer-service* through the same careful attention to orders for repair parts as was given to your original order.

We asked you to check daily performance to measure the quality of a supplier's *product.* And we showed how Research and Development helps a supplier to *set-the-pace* toward serving you best in the future with new products and product uses.

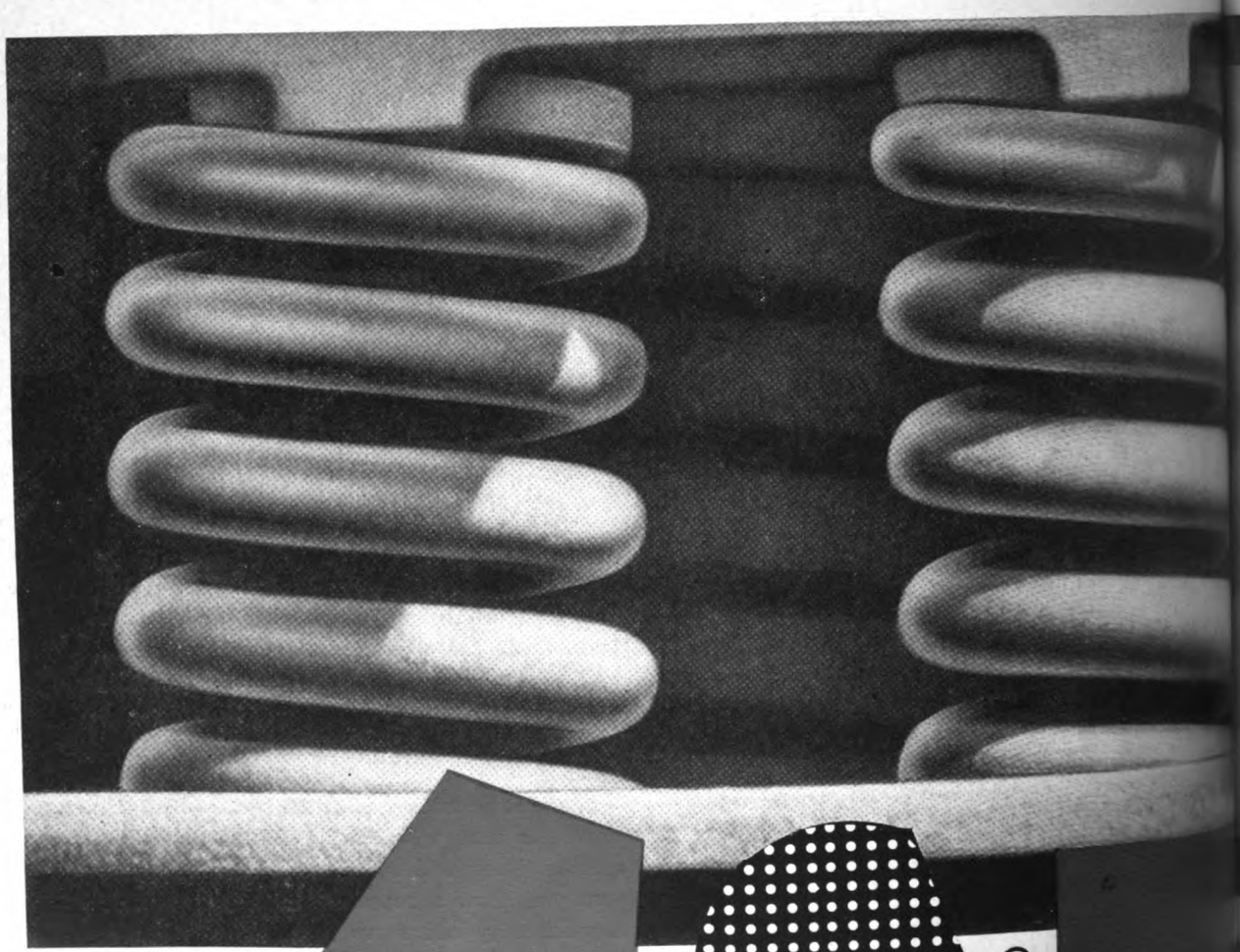
Now, we ask you to do one thing more. Study your suppliers with regard to all these areas. Use the performance of the past—and today—to measure the degree of a supplier's dependability in the future. Select a supplier who gives proof *every day* of being responsible in *all* these aspects. He is the supplier you can depend on in the future.

You will be interested in the series of advertisements that will appear in the following months. They will show, by specific product-examples, how a supplier's responsibility and dependability can serve you through greater performance and cost reduction.

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY

General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco

The spring that provides a soft ride,



GEARED TO PROGRESS
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MEMBER

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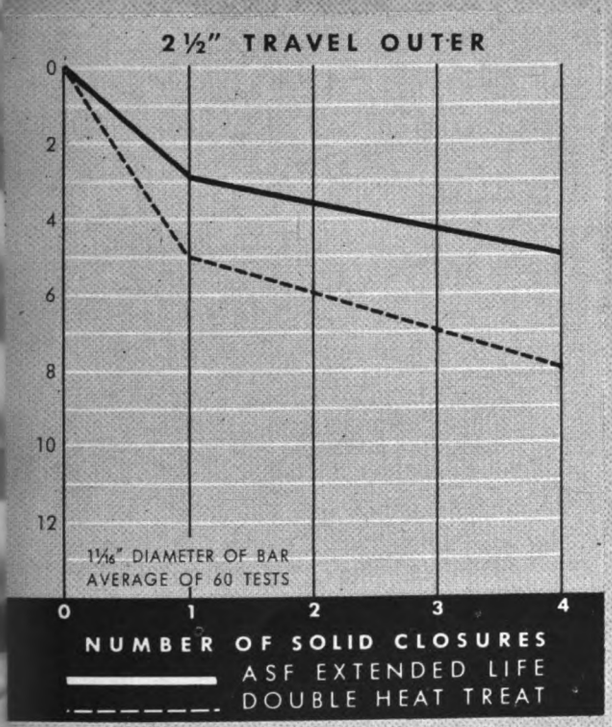


Here is one of the really significant advantages of ASF Extended Life Springs. As shown by the graph, these springs have almost twice the resistance to permanent set—compared with conventionally heat-treated springs.

In many ways this is a more important advantage of Extended Life Springs than greater resistance to breakage. Any car man can quickly detect a broken spring . . . but the *unseen* cause of many a hard-riding car is the spring that is shirking its share of the load.

ASF Extended Life Springs are available at no increase in price. How much will they save on your road? It depends on your own operating conditions . . . but specifying these modern springs will give you an automatically higher return on your spring investment.

X-T-E-N-D-E-D L-I-F-E SPRINGS

A contribution to railroad progress through research by

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

Report

(Continued from page 10)

New Books

NEW LESSONS IN ARC WELDING. Second Edition. Completely rewritten and reorganized for easier reading and use as a text or reference. Includes information on new procedures, machines and electrodes. Book divided into seven separate sections with each section comprising several lessons. Sections deal with specific instructions on arc welding techniques and related welding information necessary to the development of the techniques; the proper use of welding machines and electrodes, and reference material on metals, procedures, testing and weld symbols. *Lincoln Electric Company, Cleveland 17. Price, $1 in U.S.A.; $1.50 elsewhere.*

COPPER AND COPPER-ALLOY WELDING RODS. Second edition. Tentative specifications cover copper and copper-alloy welding rods (AWS A5.10; ASTM B259) for use with oxyacetylene, carbon-arc and gas tungsten-arc welding processes. Chemical composition, mechanical properties and usability characteristics of each of eleven classifications given, together with tests for verifying properties. Appendix provides information on the use of each filler metal for joining difference base metals with the different welding processes. *American Welding Society 33 West 39th st., New York 18, or American Society for Testing Materials, 1916 Race st., Philadelphia 2. Price, 40 cents.*

SYMPOSIUM ON VAPOR PHASE OXIDATION OF GASOLINE.—68 pages. Presents five papers discussing significant facets of the problems of vapor phase oxidation of gasoline. The symposium was originally presented at the Second Pacific Area National Meeting in Los Angeles, Calif., under sponsorship of ASTM Committee D-2 on Petroleum. *American Society for Testing Materials, 1916 Race st., Philadelphia 3. Price, $2.50.*

Selected Motive Power and Car Statistics

• Freight Service (Data from I.C.C. M-211 and M-240)

No.	Item	Month of August 1957	Month of August 1957	8 months ended with August 1957	8 months ended with August 1957
3	Road locomotive miles (000) (M-211):				
3—06	Total, Diesel-electric	38,232	37,184	294,940	296,641
3—07	Total, electric	746	741	5,557	5,835
3—04	Total, locomotive-miles	41,407	42,299	319,544	335,794
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	753	745	12,931	13,398
4—06	Empty, total	1,002	937	7,658	7,507
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—03	Total in Diesel-electric locomotive trains	114,869	108,355	869,782	852,086
6—04	Total in electric locomotive trains	2,389	2,405	17,592	18,006
6—06	Total in all freight trains	125,956	123,629	948,273	963,967
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.03	1.03	1.02	1.03
10—02	Loaded freight car-miles	44.2	43.6	43.2	42.8
10—03	Empty freight car-miles	25.9	23.8	25.6	24.0
10—04	Total freight car-miles (excluding caboose)	70.1	67.4	68.8	66.8
10—05	Gross ton-miles (excluding locomotive and tender)	3,255	3,138	3,169	3,081
10—06	Net ton-miles	1,499	1,455	1,442	1,407
12	Net ton-miles per loaded car-mile (M-211)	33.9	33.3	33.4	32.8
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	63.1	64.7	62.8	64.1
14	Averages per train hour (M-211):				
14—01	Train miles	18.5	18.2	18.8	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	59,555	56,558	58,906	56,709
14	Miles per Diesel-electric unit day (M-240):				
14—01	Road freight units	210.6	—	209.7	—
14—02	Road passenger units	444.5	—	442.9	—
18	Average net ton-miles per freight car-day (M-240)	970	965	925	942
19	Per cent of home cars of total freight cars on the line (M-240)	111.1	112.5	110.8	112.0
17	Car-miles per freight-car day (M-240):				
17—01	Serviceable freight cars	47.6	46.7	46.0	46.6
17—02	All freight cars	45.4	44.7	44.1	44.8

• Passenger Service (Data from I.C.C. M-213)

3	Road motive-power miles (000):				
3—06	Diesel-electric	19,976	20,775	156,760	163,256
3—07	Electric	1,113	1,237	9,303	10,080
3—04	Total	21,393	22,716	168,576	179,556
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	225,096	239,837	1,732,681	1,858,004
4—11	Total in Diesel-electric locomotive trains	209,427	219,377	1,601,510	1,687,032
12	Total car-miles per train-mile	9.96	10.09	9.77	9.91

• Yard Service (Data from I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,883,095	3,804,517	30,337,699	30,275,444
1—06	Total	4,038,034	4,058,590	31,642,648	32,422,021
2	Passenger yard switching hours:				
2—03	Diesel-electric[1]	240,819	248,803	1,930,924	1,982,672
2—06	Total	268,301	282,287	2,156,253	2,256,385
3	Hours per yard locomotive-day (averages):				
3—02	Diesel-electric	15.4	15.5	15.4	15.7
3—05	Serviceable	15.6	15.7	15.6	15.7
3—06	All locomotives (serviceable, unserviceable and stored)	14.4	14.3	14.3	14.2
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.64	1.65	1.69	1.68
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.73	0.73	0.77	0.75

[1] Excludes B and trailing A units.

Personal Mention

Atchison, Topeka & Santa Fe.—PETER I. ISAACSON, engineer shop extensions, Topeka, Kan. retired.

Canadian National.—RICHARD M. VEENIS, superintendent of motive power and car equipment, North Bay, Ont., appointed superintendent of motive power and car equipment, Montreal, Que.

Canadian Pacific.—J. FOWLER, general locomotive foreman, Winnipeg, Man., appointed division master mechanic, Portage division. Headquarters, Winnipeg.

Chesapeake & Ohio.—HORACE M. VISE, JR., appointed assistant superintendent car department at Grand Rapids, Mich., as announced in October issue, began railroad career as a car inspector at Clifton Forge, Va., in December 1941. Subsequently became tool car foreman; foreman car department, Newport News, Va.; general car inspector, Huntington, W. Va., and Ashland, Ky., general foreman car department, Huntington; and assistant to general superintendent car department, Richmond, Va.

Grand Trunk Western.—H. W. ASKEW, assistant general superintendent motive power and car equipment, Battle Creek, Mich. appointed general superintendent motive power and car equipment, succeeding A. SELBEE, retired. K. E. HUNT, assistant superintendent, economics branch, research and development department, Canadian National, Montreal, succeeds Mr. Askew.

New York Central.—*New York*: H. LIEBERT appointed senior industrial engineer, succeeding CHARLES A. PEASE, retired. *Collinwood, Ohio*: D. H. MALLOCH appointed manager, material inspection. R. G. SAUERMAN appointed petroleum research engineer. *Cleveland*: A. T. GREEN appointed supervisor diesel records, succeeding Mr. Sauerman.

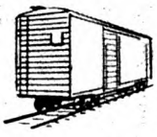
Norfolk & Western.—W. D. EMMONS,

(Continued on page 16)

SAVINGS FACTS:

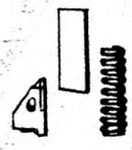
FACT No. 1

Barber Stabilized Trucks save maintenance costs. When it's necessary to service *Barber* parts, the friction castings and side springs are removed and replaced *5 to 10 times faster* than those of any competitive truck.



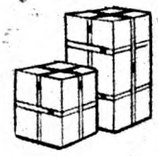
FACT No. 2

Barber Stabilized Trucks protect your equipment. Their unique system of suspension absorbs and eases . . . by friction . . . the destructive vertical shocks and bouncing as well as the lateral forces which usually result in dangerous nosing and swivelling.



FACT No. 3

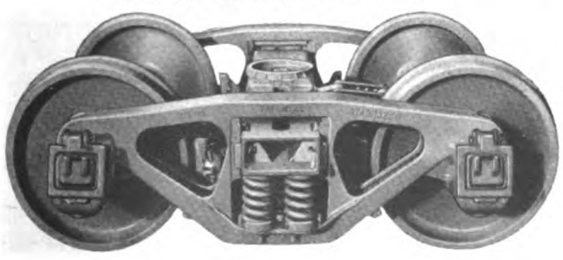
Simplicity and durability in action! Barber's three sturdy parts . . . the special *friction shoe*, the *wear plate* and the *side spring* . . . can be inspected at a quick glance. Fewest possible working parts require less attention, do a better job.



FACT No. 4

Barber Stabilized Trucks save on damage claims. They provide *the* smoother ride for ladings. Simply stated, Barber Stabilized Trucks provide variable friction for variable loads. No over-solid spring blows! For smoother-riding freight cars, insist on Barber.

Specify Smoother-Riding



BARBER

Stabilized Trucks

Standard Car Truck Company
332 S. Michigan Ave., Chicago 4, Illinois
In Canada
Consolidated Equipment Co., Ltd., Montreal 2

JAMES G. BIDDLE CO.
Electrical & Scientific Instruments
1316 ARCH STREET, PHILADELPHIA 7, PA.

FRAHM® and JAGABI®
Speed Measuring Instruments
. . . to meet every requirement
Write for Bulletin 35-X

BE SURE YOU'RE ON THE RIGHT TRACK
ALWAYS SPECIFY

MEGGER®
Electrical Resistance
Measuring Instruments
. . . for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.
Write for File RR #1

Personal Mention

(Continued from page 14)

night roundhouse foreman at Bristol, Va., appointed general foreman, succeeding J. H. HAHN, retired.

Southern.—*Birmingham, Ala.*: MERLE T. COOK appointed road foreman of engines. *Danville, Ky.*: MARVIN W. WEST appointed road foreman of engines. Foremen appointments — ROBERT J. SMITH and JAMES L. GREGORY. *Atlanta, Ga.*: Assistant foremen: ROLAN E. IVIE, ROBERT W. ELIUM, HARRELL G. VALLEY, JR. *Spartanburg, S. C.*: WILLIAM T. HESTER appointed assistant foreman. *Asheville, N. C.*: WILLIAM E. HEDGEPARTH appointed relief foreman (car department).

Obituary

LOREN S. WELLS, former electrical superintendent, Pennsylvania, died October 5 after a long illness.

JOHN S. COOLIDGE, chief engineer of the Cos Cob power plant of the New York, New Haven & Hartford, died October 4.

Supply Trade Notes

SAFETY INDUSTRIES.—*Roy A. Slettevold* has joined Safety as sales representative at St. Louis. He was previously a sales engineer for Thomas A. Edison Storage Battery Division in Chicago.

■

KAISER ALUMINUM & CHEMICAL CORP.—*Clarence W. Higbee* has been appointed assistant general manager and *Gillette N. Houck* sales manager of the newly established Electrical Conductor Division, regional sales managers for the division are: *J. W. Loveland,* northeastern region, New York; *W. J. Lawrence,* southeastern region, Philadelphia; *H. B. Stauffer,* Great Lakes region, Cleveland; *J. G. Johnson,* north central region, Chicago; *E. K. Matteson,* south central region, Kansas City; and *L. M. Guibara,* western region, Los Angles.

■

SHELL OIL COMPANY.—A regional railway sales office has been opened in Chicago, enlarging the territory formerly handled out of the St. Louis office. *L. L. Butcher,* formerly regional manager of the railway sales office there, is regional manager in charge of the new office. He is assisted by *J. C. Kleber* and *Edgar R. Shutz,* formerly of St. Louis.

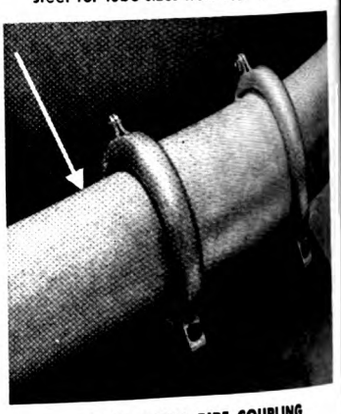
■

A. M. BYERS COMPANY.—*A. S. Chalfant* has been appointed director of steel sales at Pittsburgh.

(Continued on page 18)

MARMAN
Joints and Couplings Speed Connection
OF LOCOMOTIVE PIPE AND TUBING

SERVICEMASTER V-BAND TUBE JOINT
for diesel engine exhaust systems features quick installation and disassembly for servicing. Bolted flanges are eliminated. Available in corrosion-resistant and mild steel for tube sizes from 1½" to 4½".



FLEXMASTER PIPE COUPLING
for diesel hot water and lube oil systems features quick assembly, with no pipe cutting or threading. It absorbs vibration, allows minor misalignment. In sizes for 2½" and 3" pipe.

Servicemaster and Flexmaster are Aeroquip Trademarks

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Aeroquip Corporation

Industrial Sales Division
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In Canada: Aeroquip (Canada) Ltd., Toronto 19, Ont.
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Company
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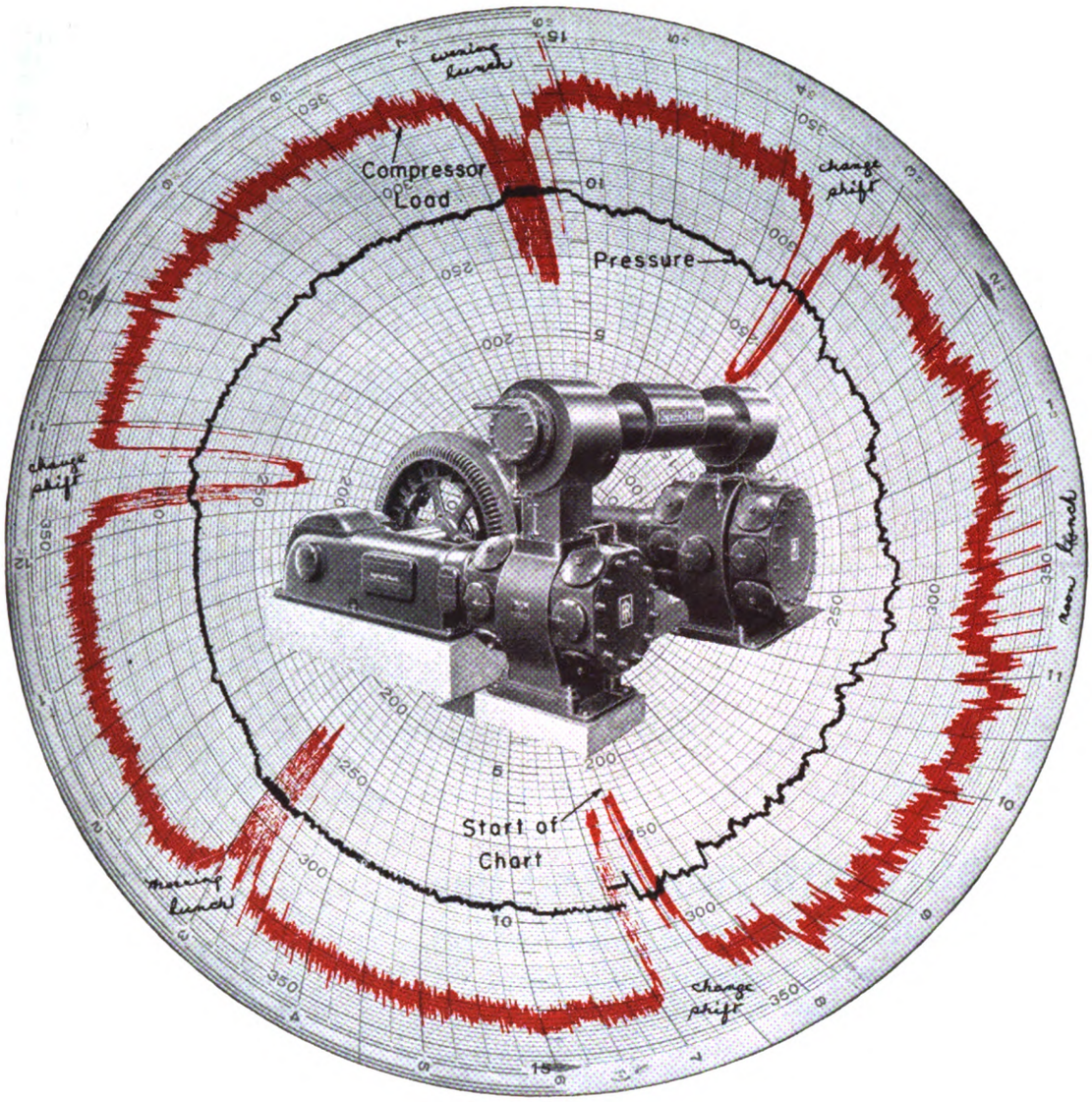


AROUND THE CLOCK

with an Ingersoll-Rand PRE Compressor

Heavy 24-hour loading like this is all in a day's work at Caterpillar Tractor Co.

An air compressor doesn't punch a time clock. But the 24-hour pressure-capacity chart shown above gives an even better record of its actual, on-the-job performance at Caterpillar Tractor Co., Peoria, Ill.

This chart was taken on a nine-year-old PRE compressor supplying 3330 cfm at 95 psi for general plant air. Except for a slight "breather" during changing of shifts, this heavy-duty compressor is called upon to deliver full rated capacity virtually 24 hours a day — month after month, year after year.

This compressor is one of eight PREs (total capacity 24,640 cfm) in round-the-clock service at the Caterpillar plant. The first PRE unit was installed here in 1927 and, like all the rest, is still giving efficient, dependable performance under full load conditions.

For proved dependability like this, in continuous heavy-duty service, it pays to specify Ingersoll-Rand compressors. Ask your I-R representative to give you the complete story.

PRE compressors, 400 to 3000 hp, use I-R Channel Valves

Ingersoll-Rand

1-567

11 Broadway, New York 4, N. Y.

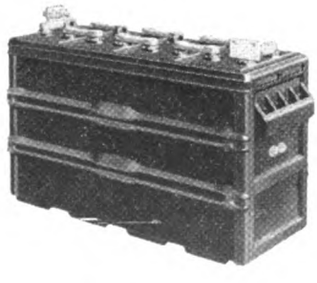
COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS

NEW BULLETIN gives latest tips on C&D Diesel Starting Batteries

Tells how to reduce locomotive maintenance ... how to 'start your Diesels fast'

Motive power men and purchasing agents will find page after page of useful money-saving information in this comprehensive new bulletin on "Diesel Locomotive Batteries." Expressly prepared to help railroad men specify the right type batteries for dependable Diesel cranking service, this illustrated guide gives the complete "inside story" on the construction and operation of powerful C & D *Slyver-Clad*® batteries. Conventional lead-antimony types ... special low types ... as well as the latest lead-calcium extra-long-life types are covered. Detailed charts show you how to specify the exact type battery you need for reliable low-maintenance operation.

Write for a copy. You'll find it an important addition to your technical library.



Batteries built to give quick, sure starts ...

With extra-thick, extra-long plates ... and exclusive *Slyver-Clad* construction ... C & D Diesel Starting Batteries provide power-*plus*. "Better Built Batteries" also assure:

- *high sustained voltage during cranking*
- *reduced connector loss*
- *reduced maintenance requirements*
- *long, dependable operating life*

WRITE FOR BULLETIN DL-577

C&D BATTERIES, INC.

of Conshohocken, Pa.

SINCE 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

Supply Trade Notes

(Continued from page 16)

GENERAL ELECTRIC COMPANY.—The Locomotive and Car Equipment Department at Erie, Pa., has been reorganized into three independent product sections. *Frank A. Compton, Jr.*, has been appointed manager of the Locomotive Section; *Forman H. Craton*, manager of the Equipment Section, and *Joseph U. Neill*, manager of the Repair and Renewal Parts Sales Section. Mr. Compton was previously manager of engineering for the department; Mr. Craton, manager of marketing, and Mr. Neill, manager of the parts and repair sales subsection.

■

EVANS PRODUCTS COMPANY.—*R. K. Tobin* has been transferred from Plymouth, Mich., to Chicago where he will be district sales manager, Railroad Loading Division.

■

DEARBORN CHEMICAL COMPANY, LTD.—*Thomas F. Klein*, vice-president, Railroad Division, will retire January 1. *William H. Spencer* will assume Mr. Klein's duties as special representative, Railroad Division, with headquarters in Montreal.

■

JOY MANUFACTURING COMPANY.—*William L. Wearly* has been elected president, succeeding *John Lawrence*, resigned.

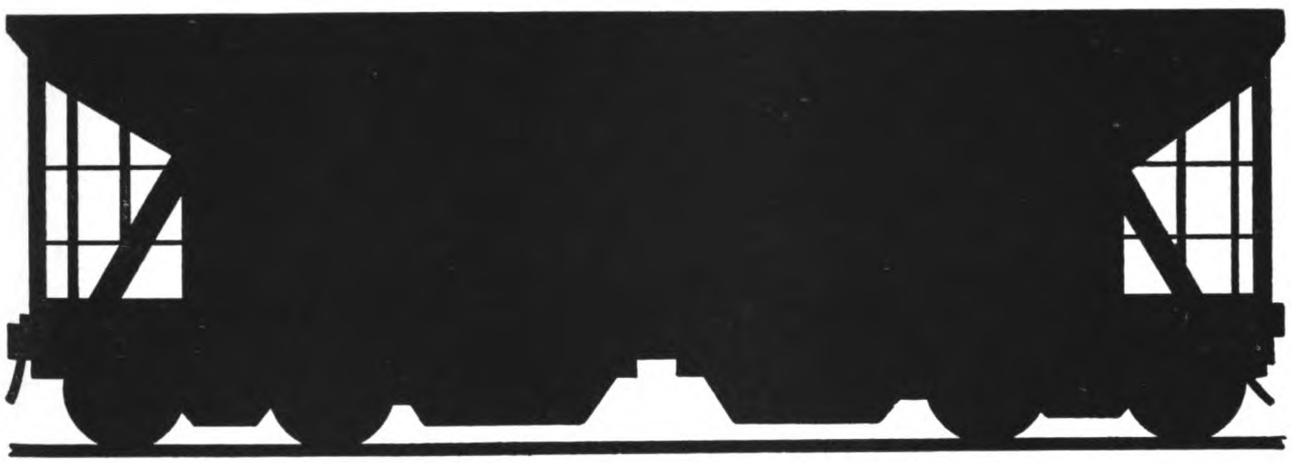
■

East Bay of new GM test building at London, Ont., has three work levels.

GENERAL MOTORS DIESEL LIMITED.—A new building for the testing of locomotives and mobile power cars has been placed in service in London, Ont. It is 120 ft long and 50 ft wide and houses four road locomotives. Three work levels in the East Bay of the building permits inspection of all parts of a locomotive. The unheated West Bay, separated by a concrete wall for noise suppression, is intended to house units under standing load and consuming great quantities of outside air. Banks of resistor grids permit simultaneous testing of two locomotives or one locomotive and one stationary unit or a power car.

(Continued on page 22)

Get these advantages of Armco High Strength Steels for freight cars



Armco's two grades of high strength, low alloy steel offer these important advantages for freight car construction:

ARMCO HIGH STRENGTH No. 1 meets the requirements of A.S.T.M. Specification A-242-55. It provides 4 to 6 times the atmospheric corrosion resistance of ordinary carbon steel used in car parts. And it's extra strong, with yield strength of 50,000 psi min.; ultimate tensile strength, 70,000 psi min. It is easily welded by standard methods.

ARMCO HIGH STRENGTH No. 2 provides the same high degree of atmospheric corrosion resistance and weldability as No. 1, plus typical yield strength of 45,000 psi and typical ultimate tensile strength of 64,000 psi. But in addition, it is specially processed to form well in bending, flanging, and moderate stamping.

SAVE MONEY

Used in place of ordinary carbon steel body sheets, either No. 1 or No. 2 will supply much longer service life—save money by lengthening time between repairs.

For more information about these long-lasting Armco High Strength Steels for freight cars, just fill in and mail the coupon, or call the Armco Sales office near you today.

ARMCO STEEL CORPORATION
2377 Curtis Street, Middletown, Ohio

Send more data about Armco High Strength Steels

Name_____ Title_____

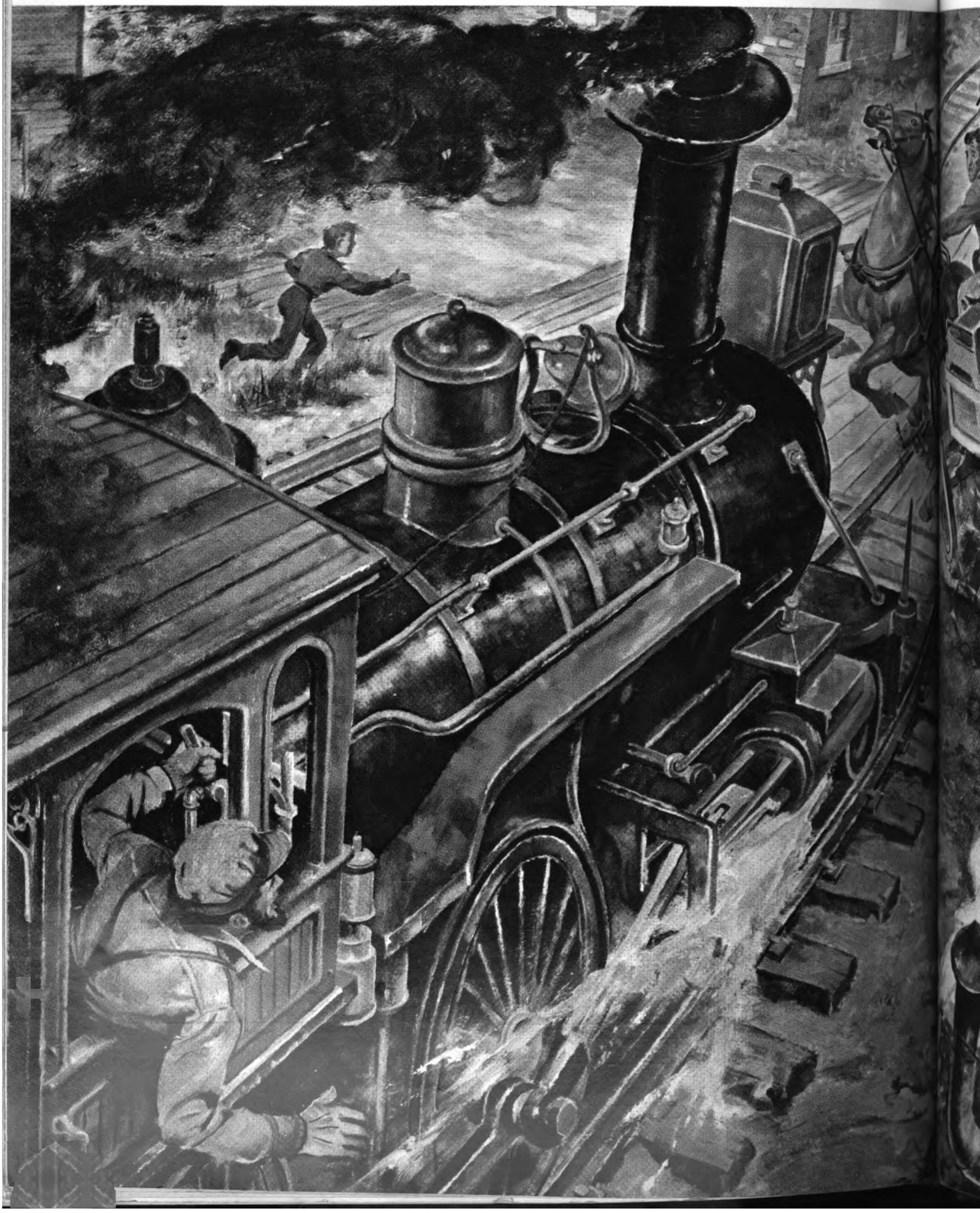
Company_____

Street_____

City_____ Zone_____ State_____

ARMCO STEEL CORPORATION
2377 CURTIS STREET, MIDDLETOWN, OHIO
SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

"He'll never stop



"hat train in time!"

The dramatic incident that started George Westinghouse, inventor of the air brake, on the road to the Hall of Fame for Great Americans.

THE PAINTING shows a famous event in railroad history. Twenty-four-year-old George Westinghouse was demonstrating a new brake for trains. He said he could do the job with compressed *air*, instead of a long chain that stretched between cars. At that time, very few people thought an "air brake" would work.

The test train clanked out of Grant's Hill Tunnel in Pittsburgh —but there, right on the tracks, was a team of horses and a wagon. The engineman yanked the strange new brake lever for a full emergency stop. The brakes clapped shut on the wheels, and the train slid to a stop only four feet from the terrified, bucking horses. Never before had a train stopped so quickly. The dramatic story was told all over the land, and young George had won his first round toward total acceptance of the Westinghouse Air Brake.

On December 1, 1957, a bronze bust of George Westinghouse was unveiled and permanently enshrined in the Hall of Fame for Great Americans. The choice was made by a select committee of 125 distinguished Americans representing every state in the Union. Only 86 Americans have been so honored . . . among them such men as George Washington, Abraham Lincoln, Benjamin Franklin, Samuel Morse, Eli Whitney, Robert Fulton and Alexander Graham Bell.

The first company formed by George Westinghouse was the Westinghouse Air Brake Company. Following the policies he established, the Westinghouse Air Brake Company has carried on for more than 88 years a continuous program of research and development which has made it, today, the largest manufacturer of railroad air brake equipment in the world.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

Supply Trade Notes

(Continued from page 18)

AMERICAN STEEL FOUNDRIES.—*C. E. Grigsby,* vice-president in charge of sales, Transporation Equipment Division, Chicago, has been named vice president and general manager, and is succeeded by *William C. Taylor,* vice-president, New York sales office. Mr. Taylor's successor is *John C. Day,* district sales manager, New York, who becomes assistant vice-president. *Carl E. Tack,* chief mechanical engineer, promoted to vice-president and chief mechanical engineer.

OAKITE PRODUCTS, INC.— *Vern M. Coulson,* representative in Evansville, Ind., has been transferred to Ft. Worth, Tex., and *Thomas A. Reilly, Jr.,* has been assigned to Trenton, N. J. Both are technical service representatives.

■

THOR POWER TOOL COMPANY.—*A. V. Moroz,* electric tool salesman, has been appointed electric tool sales manager, Chicago branch.

■

UNITED STATES STEEL CORPORATION, AMERICAN STEEL & WIRE DIVISION.—*Maxwell D. Millard,* general manager of sales, has been named assistant vice-president-sales. His successor is *Howard B. Maguire,* central area manager of sales, who in turn has been succeeded by *Norman M. Sted,* assistant general manager of sales. All have headquarters in Cleveland.

■

SPARTON CORPORATION.—*W. Bradley Gilkey* has been appointed western sales manager and special representative, Tri-Belt Division. Mr. Gilkey was formerly sales engineer, Evans Products Company. *Ralph L. Hitz* has been appointed sales and service engineer, Tri-Belt division.

■

CRUCIBLE STEEL COMPANY OF AMERICA.—*Lester C. Hill,* metallurgical engineer, has been appointed assistant sales manager of the Pittsburgh, Pa., Crucible Sales Division.

■

ARCHER-DANIELS-MIDLAND COMPANY.—*Bruce C. Gunnell* of Gunnell Engineering & Equipment Co., Alexandria, Va., will represent Freight Liner to railroads in the southeast, and *W. D. Jenkins,* Dallas, Tex., will be Freight Liner representative to railroads in Texas and the south central region.

■

C & D BATTERIES, INC.—*Edward H. Gossling, Jr.,* of *Charles F. Gross Associates,* C & D's Philadelphia sale office, has been appointed a C & D salesman in the Baltimore territory. *Donald G. Ihrig* of *Agair Equipment Company,* C & D's Chicago sales representative, has been appointed a C & D salesman in the Chicago territory.

■

WAUKESHA MOTOR COMPANY.—*J. Grant Swain* has been appointed vice-president of sales, and *Newton H. Willis,* vice-president of engineering.

■

FAIRBANKS, MORSE & CO.—*James G. Graham,* general manager, Railroad Division, Chicago, has been appointed manager of the Los Angeles sales and service branch, succeeding *Paul A. Suess,* who retires January 1.

Obituary

ARTHUR A. LOGMANN, 64, manager of works, Pullman-Standard Car Manufacturing Company, died October 7 in St. Anthony's Hospital, Michigan City, Ind.

■

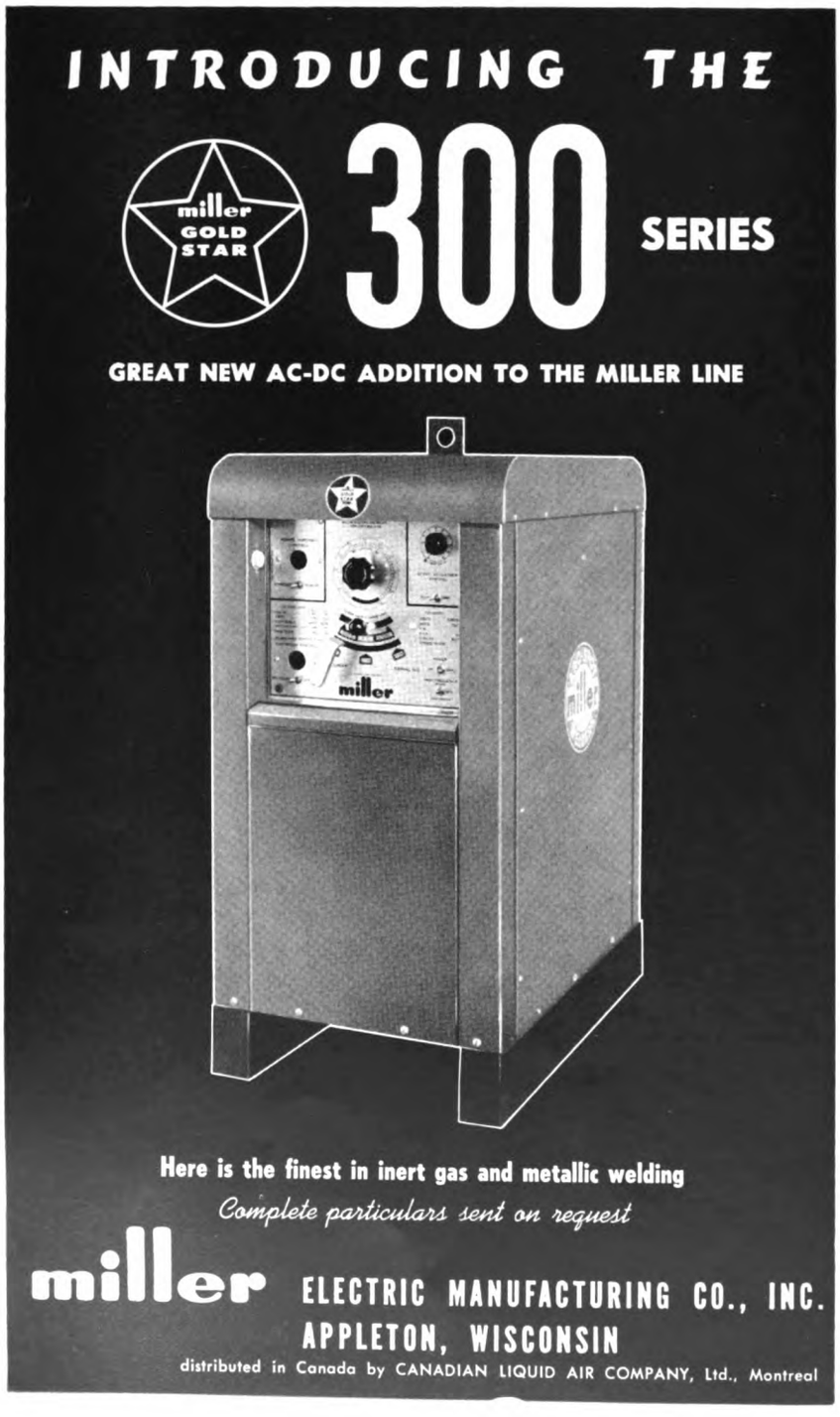
DR. PAUL DYER MERICA, who retired as president of the International Nickel Company of Canada in April 1954, died on October 20 in Tarrytown, N. Y.

■

WILLIAM J. PALLOWICK, 65, railroad representative for the Chicago Pneumatic Tool Company, died in Chicago September 22.

■

EDWARD J. BYRNES, JR., assistant general manager of sales, Eastern Division of the Colorado Fuel & Iron Corp., died October 8 at Palmer, Mass.



The Engineer's Field Report

CASE HISTORY

PRODUCT Chevron Starting Fluid

FIRM Great Northern Railway Havre, Montana

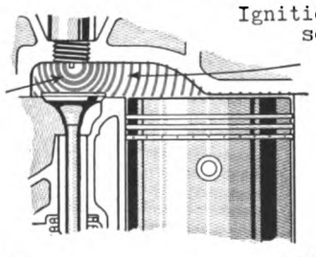
Special fluid starts 250-ton crane instantly, saves time in emergencies—even at 50° below

GREAT NORTHERN RAILWAY'S 250-TON, RAILROAD CRANE (above) starts instantly with Chevron Starting Fluid in temperatures ranging to 50° below zero—even after standing idle for months at a time. Former steam-powered wrecker equipment took crew 12 hours to start. This crane with its two 174 h.p. Cummins diesel engines is now available for derailment emergencies on short notice.

"Slow-grind starts on battery power alone waste too much valuable time. Chevron Starting Fluid fires these engines 'right now'—in any weather." A Great Northern engineer shows how simple it is to insert 7CC gelatin capsule of Chevron Starting Fluid in unit's air-intake system. Fluid is also available in 17CC capsules and 1-pint cans.

Why Chevron Starting Fluid starts engines instantly

Highly volatile: 7 times more than gasoline



Ignition temperature several hundred degrees lower than diesel fuel

Contains wear-reducing lubricants

Additives inhibit ice formation

CHEVRON STARTING FLUID

FREE FOLDERS tell more about the Chevron Starting Fluid and Chevron Pressure Primer System. Write or ask for them.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "CHEVRON" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

(Continued from page 6)

is circulated without the need of a fan. More or less radiant heat is projected to warm the floor, depending on the number of heating elements energized.

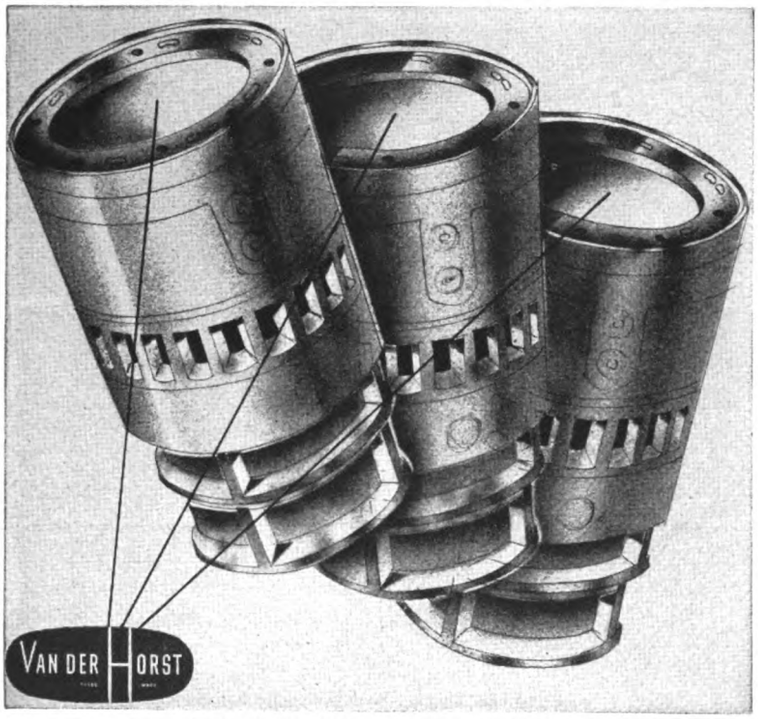
On most locomotives, there is sufficient auxiliary generator capacity to supply two 1.6-kw heaters. A Convect-air heater, mounted on the front or side wall of a cab, projects a satisfactory amount of warm air toward one within three feet of the unit. *Ogontz Controls Company, Dept. RLC, 8029 York Road, Elkins Park, Philadelphia 17.*

Welding Blowpipe

The Oxweld W-47 blowpipe can weld any metal thickness from 28 gage to 3-in. and handle heating jobs requiring total gas flow up to 1500 cu. ft. per hour. Change of welding heads convert blowpipe from light-duty welding and brazing to heavy-duty welding or heating. A cutting attachment equips blowpipe for flame cutting metal up to 8-in. thick.

The W-47 is equipped with a new spring-type coupling nut, "O" ring gas seals and self-seating valves. Internal parts and handle are stainless steel and welding heads are chrome plated. *Linde Company, Div. of Union Carbide Corp., Dept. RA, 30 East 42nd st., New York 17.*

5 *big advantages of*



VAN DER HORST

PORUS - KROME

Good for the Life of your Engines

- INCREASES CYLINDER LIFE 3 TO 5 TIMES.
- INCREASES PISTON RING LIFE UP TO 50%.
- ELIMINATES STOCKING OF OVERSIZED PISTONS AND PISTON RINGS.
- DEFINITELY CONTRIBUTES TO REDUCED DOWNTIME FOR ENGINES.
- DEFINITELY CONTRIBUTES TO A REDUCTION IN LUBE OIL CONSUMPTION.

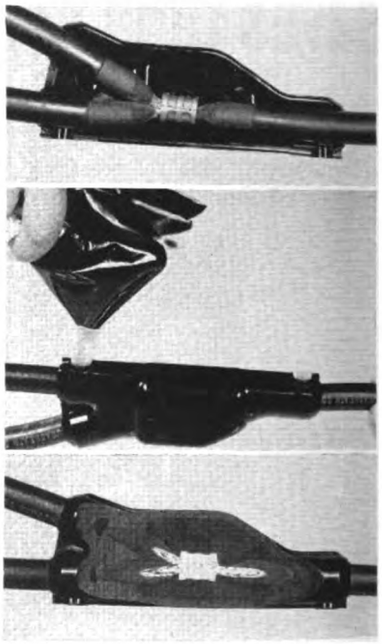
—Write Dept. B, VAN DER HORST CORP., OLEAN, N. Y.—

OLEAN, NEW YORK
HILVERSUM, HOLLAND
CHICAGO, ILLINOIS

VAN DER HORST

TERRELL, TEXAS
LOS ANGELES, CALIFORNIA*

*SparTan Engineering



Cable Splices In Epoxy Resin

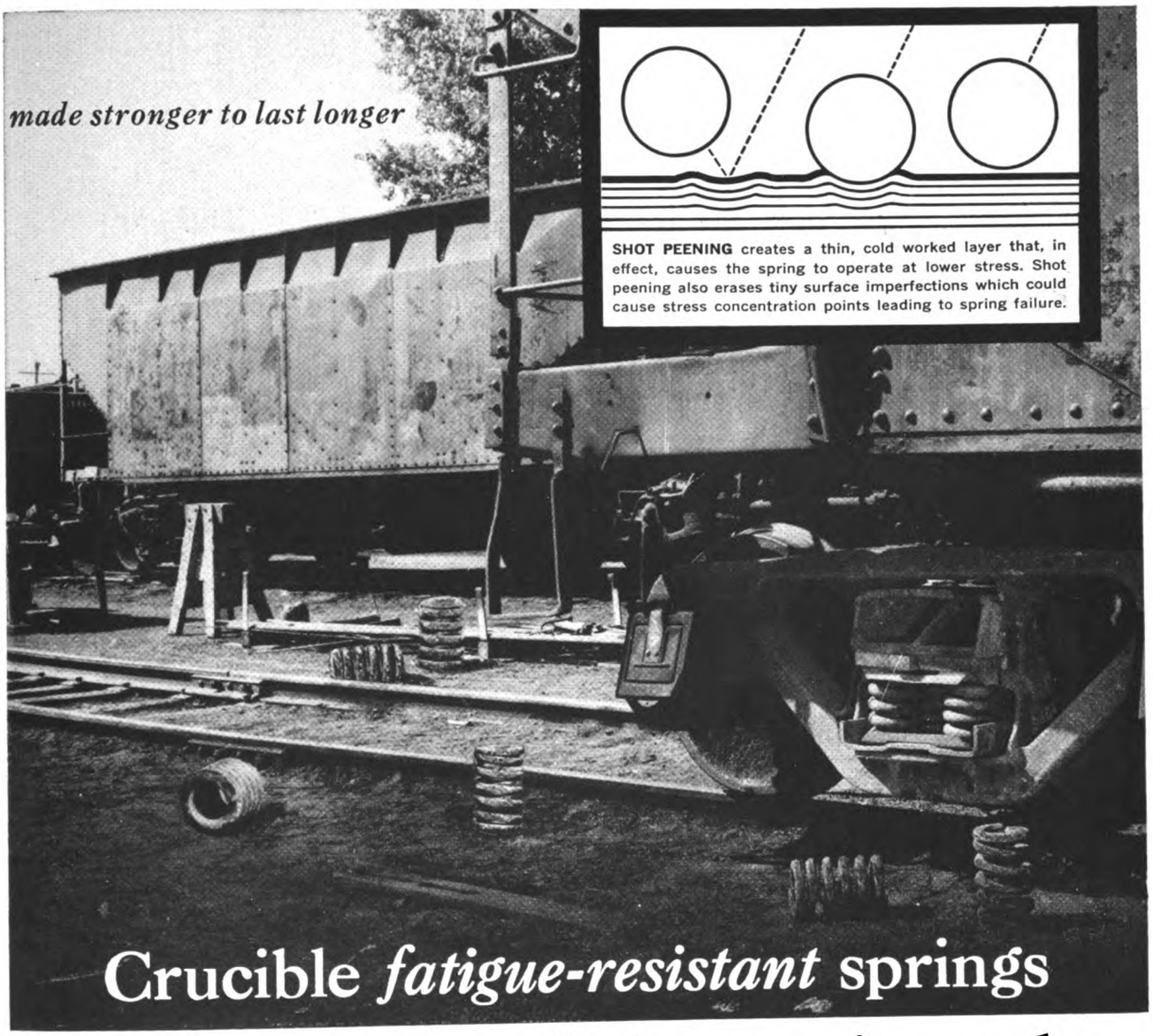
Embedding tap or branch electric cable splices in epoxy resin is now possible using a new Scotchcast splicing kit. Splices can be insulated in the field in less than 10 min. Once a splice has been cast, it is permanently encased in a block of insulating resin which, the manufacturer states, will remain solid and watertight despite aging, heat and pressure.

The kit consists of a two-piece plastic mold, two plastic spouts, strips of sealing tape for the mold joints and a Unipak container of epoxy resin. *Minnesota Mining & Manufacturing Co., Dept RLC, St. Paul 6, Minn.*

Air Impact Wrench

A completely new mechanical design enables the Sioux wrench to deliver as much as 15 per cent more torque while consuming 30 per cent less air. With 90 psi air pressure at the wrench, Model 315 delivers 120 torque ft-lb in 10 sec; Model 317, 185 torque ft-lb in 10 sec. Powdered iron bearing surfaces on motor end plates wear longer and permit a

(Continued on page 64)



help keep cars off the repair tracks

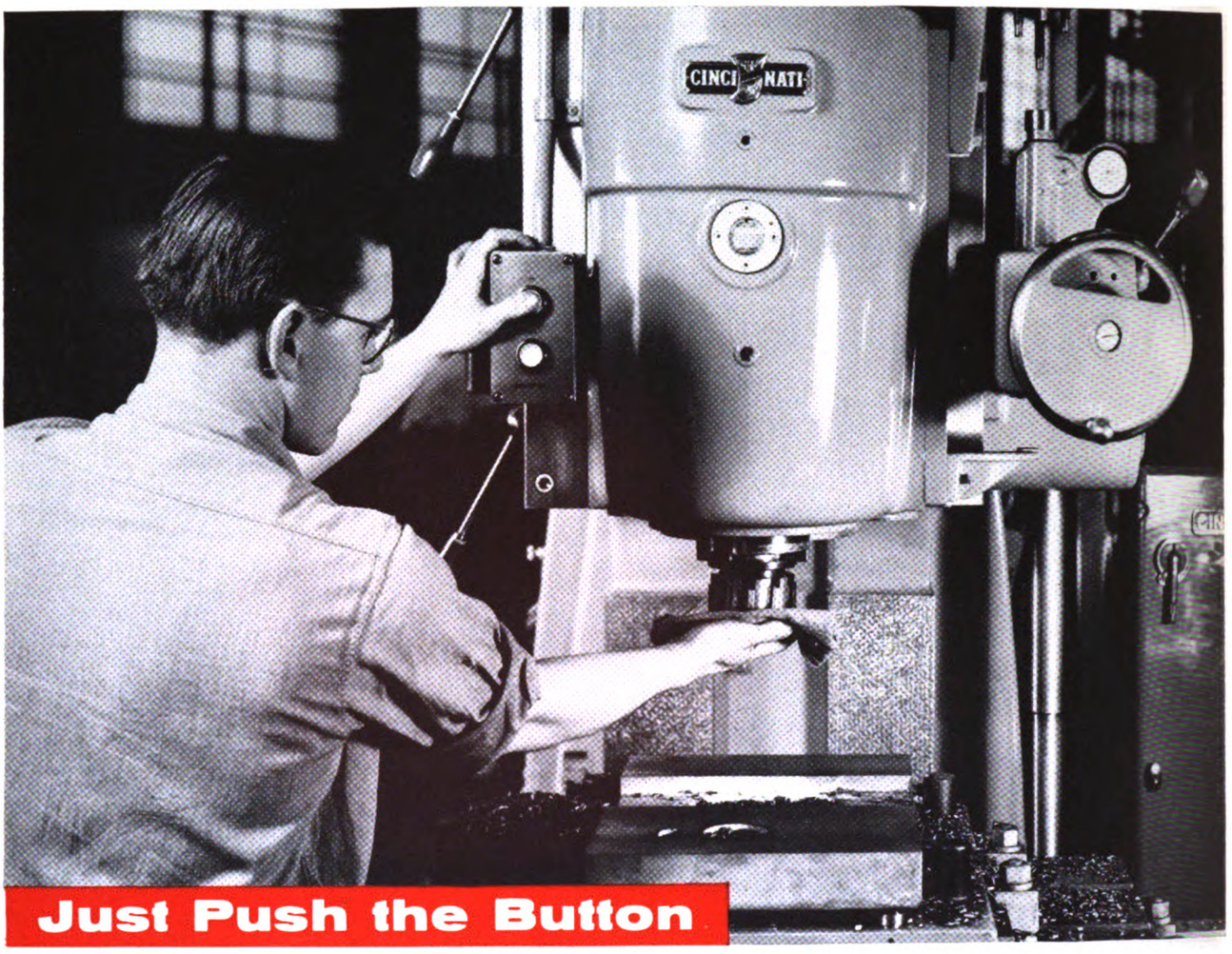
Three major railroads report: 90% of all car springs fail due to permanent set – only 10% due to other causes. You can reduce the frequency of failures by using Crucible's single heat treated *fatigue-resistant* springs. They're *made stronger to last longer*, yet cost no more than conventional springs.

Crucible *fatigue-resistant* springs are stronger because they're single heat treated and shot peened. These processes provide better hardenability, higher elastic limits and greater resistance to working stresses.

Help keep cars off the repair tracks and reduce "bad-order" car expenses by using Crucible *fatigue-resistant* springs. They're your best guarantee of long, low-cost spring service. For further details, write for folder: *Spring Division, Crucible Steel Company of America, McCandless Avenue, Pittsburgh 1, Pa.*

CRUCIBLE spring division

Crucible Steel Company of America

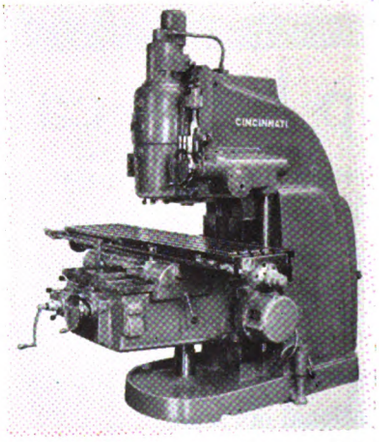


Just Push the Button

...Cincinnati power drawbar attachment does the work of releasing and tightening arbors

No more tugging and pounding, or climbing up on the table when necessary to change milling cutters for multiple operation work. Cincinnati Power Drawbar Attachment does the job for the operator, instantly, safely. Just push one button and the arbor is tight in the machine spindle; push another button and the arbor is released. This equipment can be applied to all CINCINNATI® High Power and Dual Power Dial Type Milling Machines. ¶ These fine milling machines have many desirable advantages for railroad shops . . . 24 spindle speeds 100 to 1 ratio; 32 feeds ⅜ to 90 ipm; power speed and feed selection with a single lever; automatic backlash eliminator; automatic table feed cycles (plain and vertical); power feed to vertical head, and 22 additional advantages outlined in the catalog. Want a copy? Ask for publication M-1917-3. Brief specs in Sweet's Machine Tool File.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



CINCINNATI Vertical Dual Power Dial Type Milling Machine equipped with Power Drawbar Attachment. Catalog M-1917-3.

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

C&NW Concentrates at Clinton

New car shop consolidates repairs formerly done at 14 different points on railroad; new cars will be built.

Fourteen months ago, ground was broken at Clinton, Iowa, for the first centralized freight-car repair facility in the Chicago & North Western's history. Covering 32 acres, this $6 million assembly-line shop will have a capacity for heavy repair of 7,000 freight cars and construction of 1,000 new cars annually.

More than 2,000 cars have already been processed, although construction is not yet complete. Planned new car construction will mark the first time in forty years the railroad will build new cars to supplement cars purchased from manufacturers.

"Consolidation of repair and new construction at one point," said B. W. Heineman, chairman of the board, at the official opening ceremonies, "permits full use of modern assembly-line methods and mechanization with all production operations under cover for steady output the year around, regardless of the weather." The facility now has a working force of 350 men and under full production, the shop will employ about 500 men.

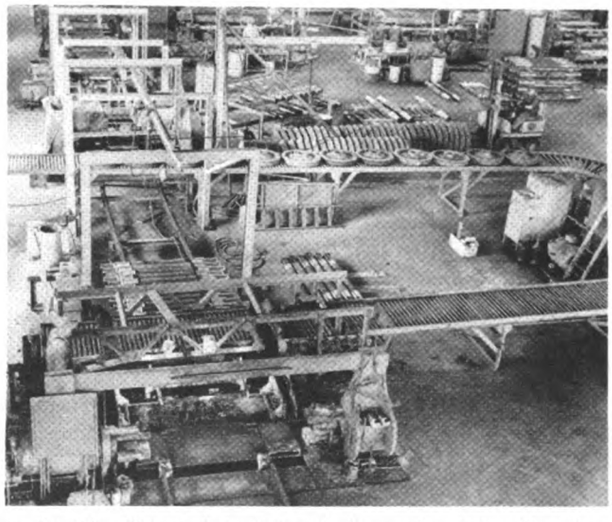
The erecting and fabricating shop, and the paint shop were built over the former Fifth Street Yard. Changes in operations in 1956 concentrated all switching to the West Clinton Yard, west of the car shops. Complete dieselization at the same time, released a number of buildings until then used for steam and diesel repair shops.

Among buildings converted was the locomotive repair shop to a wheel shop, and the machine shop to an air brake and accessory shop. Numerous track changes were also made. New buildings include the erecting and fabricating shop, oil storage facilities, paint shop, and welfare building for employees.

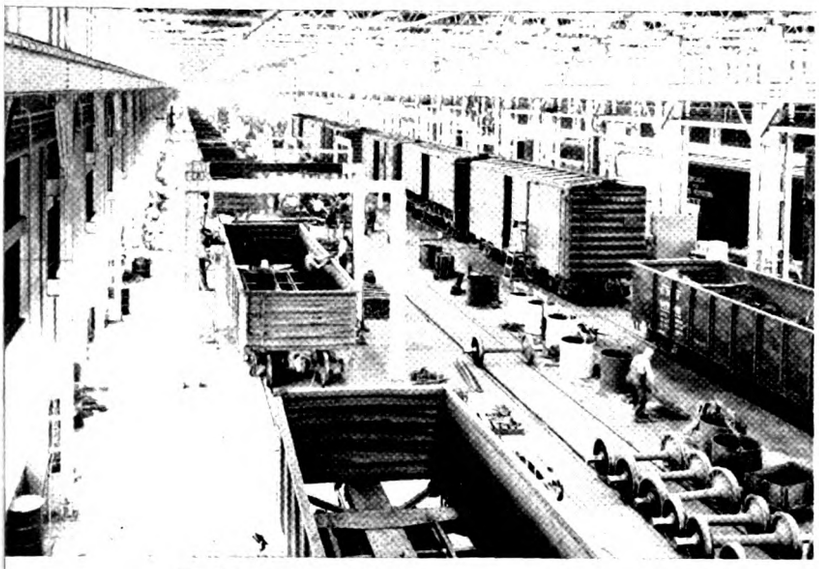
The erecting and paint shops are structural steel, mostly bolted construction, with roof and sides covered with Robertson Galbestos metal siding. Alternate vertical panels of a translucent corrugated fiber glass impregnated with resin are used along the upper sides and horizontal panels on roof. The shops are equipped with Kinnear rolling doors, electrically operated. All outdoor craneways and wheel storage racks are new.

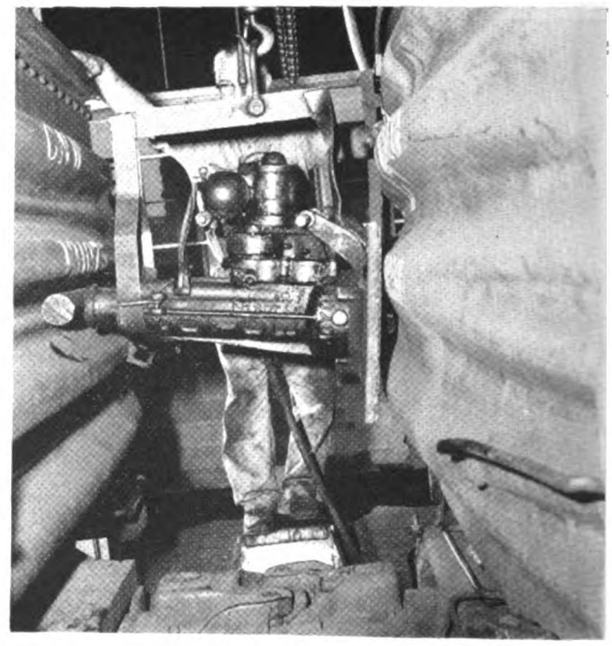
The collecting point for cars needing repairs is the East Clinton Yard, across the river. Some strip-

Palletized air brake parts move into shop on right. Disassembly is done on near side of table. Reconditioned and new parts are assembled



on far side—then sent to test rack for service tests. Conveyors, cranes and hoists mechanize wheel shop.





Gondola production line turns out one car every 27 min. Truck assemblies are done on adjacent track. Hydraulic jacks take bow out of ends and sides of cars.

ping is done here, and all cars are sent to the shop generally are of one type or series to permit utilization of assembly-line methods.

Erecting and Fabricating Shop

This is the largest of the shop buildings, 1,000 ft long and 160 ft wide, covering 160,000 sq ft. It is divided into two bays, each 1,000 ft long and 80 ft wide. Each bay has two 10-ton overhead cranes operating the full length for transfer of materials and for raising and lowering cars under repair or construction. The crane runways in the north bay, which has an additional 30-ton crane, extend outside on the east end for 700 ft over a material storage yard covering an area of 56,000 sq ft. This eliminates the necessity of stockpiling materials not immediately used in production area within shop. Land is available for a further extension of 700 lineal feet in this storage area.

Heavy repairs to freight cars are done in this building. The cars are stripped down, depending on the nature of the repairs needed, and rebuilt. Damaged parts are repaired and if too far gone are replaced with new parts. New car construction is also done here. Sufficient trackage is available for work on 60 cars at one time.

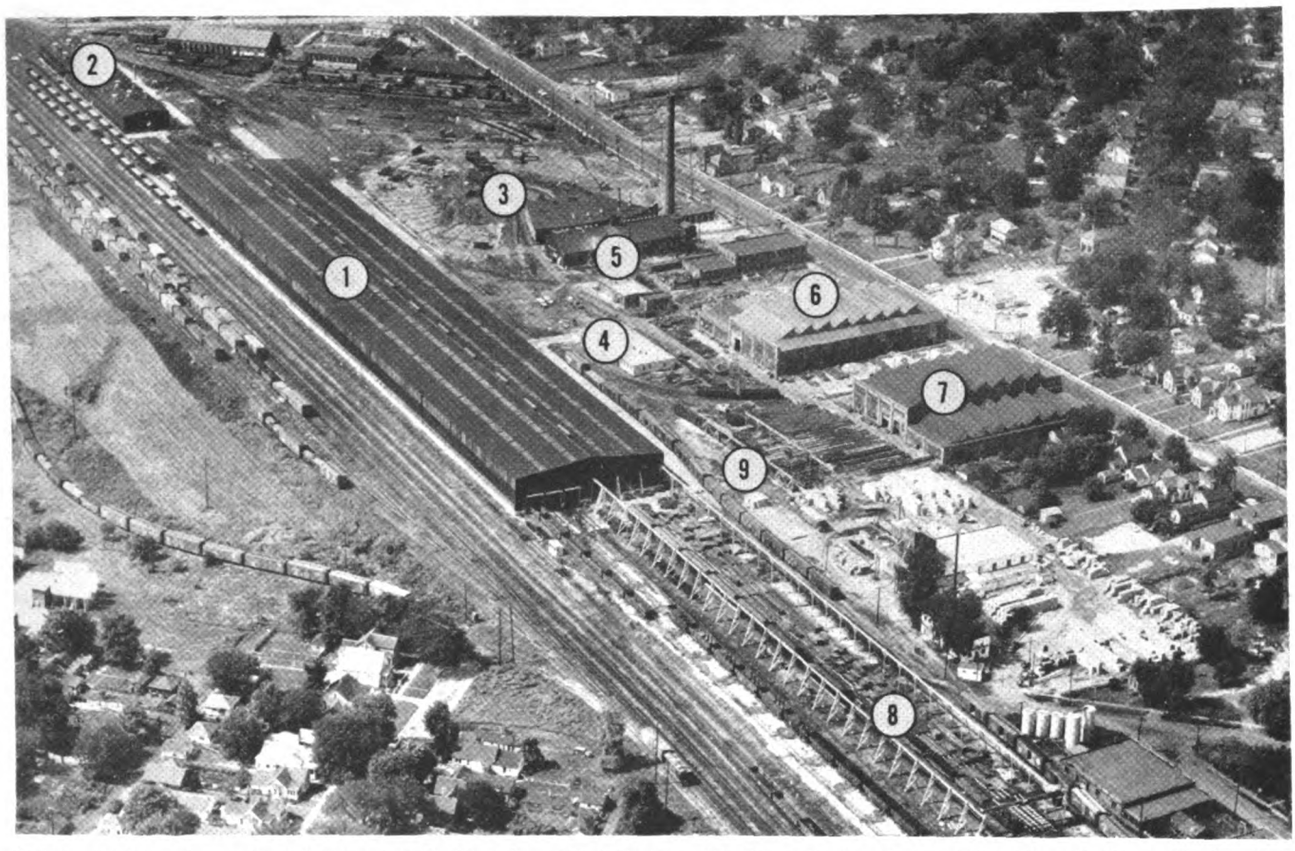
The south bay is reserved exclusively for car repair. It has three tracks which continue on through the building, converging into two of three tracks leading into the paint shop. Work here covers any damage to a car, such as welding or replacing side sheets, replacing floors and sides, straightening or replacing damaged ends. Such parts as wheels and air brakes are checked, and if servicing is needed, they are replaced by serviced parts from the wheel and air brake shops. Outside the south bay at the east end is a new Fairbanks Morse 200-ton car weighing scale 60-ft long. Cars repaired or constructed in the shops are weighed after they are painted and just before final stenciling is applied.

The north bay has one through track which will be used for construction of new cars. This track also leads into the paint shop. Another track comes into this bay about 400 ft from the west end for use in construction of certain car assemblies, and special car work not requiring a full production line. The east end of this bay contains the fabricating department. A variety of forming and punch presses, metal shearing and other fabricating machinery is located here. Foundations are ready for a new Verson 800-ton press for forming ends of gondolas, etc. Other new machines include a Beatty multiple punch for center sills with a 60-ft bed on each side, and a combination Cincinnati punch and shear for handling car side sheets. Welding machines are spaced to advantage throughout the shop. In both bays, the production line moves from east to west toward the paint shop.

Paint Shop

Four through tracks in the main shop converge into three tracks leading into and through the paint shop. This building is 400 ft long and 60 ft wide, and has a capacity of 24 cars at one time. Electric-powered pullers bring the completed cars from the main shop. These pullers were formerly hoists obtained from dismantled coal chutes. At the east end of shop, cars are treated with hot, dry air to eliminate all moisture from rain or snow. The cars are then sprayed with a protective coating, the paint coming from one central source under pressure. There are 24 stations, for either car cement (heavy asphalt) or standard car paint. Paint is received in 55-gal drums, transferred to tanks and pumped through lines. Tracer lines with forced hot water are adjacent to paint lines, lagged together to keep the paint warm, provide uniform consistency and accelerate drying. Grayco nozzles, pumps and spray guns are used for application of paint.

The system is so constructed that paint keeps circulating in the pipes when not in use. Air, oil, oxygen and acetylene are piped into shop. A color paint scheme assures proper identification of lines. A modern ventilating system, containing filters to trap the escaping paint spray is



Location of the various units at Clinton: (1) Erecting shop; (2) Paint shop; (3) Future lumber storage; (4) Welfare building; (5) Acetylene generating plant; (6) Air brake shop; (7) Wheel shop; (8) Material storage yard; (9) Fuel and oil supply pumping station

provided. To accelerate drying after cars are painted, they are treated with forced hot air at the west end of shop before stenciling. Under full production, the shop will have a maximum output of 40 cars per day. A 40-ft box car requires about 40 gallons of protective coating.

Wheel Shop

This building covers an area of 33,000 sq ft. In addition to the indoor area, substantial space outdoors is reserved for storage of wheel sets and new wheels. Two tracks serve this area, with a 5-ton overhead crane. All wheels and axles, not only for cars going through the main shop, but for all points on the railroad, go through this shop for servicing. Mechanization and assembly-line operations reach a high point in this shop. The wheels and axles travel to and from machines over lines of conveyors designed by North Western engineers. Scrap wheels leave the shop on their own conveyor system. Wheel sets requiring journal attention only are moved to journal lathes. Other wheel sets with more serious defects have the wheels pressed off, the axles moving automatically over mechanical conveyors to and from machine lathes. Unserviceable wheels are raised on an elevator to an overhead railway where they roll by gravity across the shop and into a scrap bin outside served by a 5-ton crane. Cast-iron wheels are segregated from the steel wheels by a switching arrangement controlled by the operator of the wheel press. Serviceable wheels go into storage for reuse or turning. All axles are inspected by black light for flaws. The wheel shop is still not fully equipped, but present production is about 140 wheel sets per day. With a force of 48 men, the shop is expected to turn out 40,000 sets of wheels per year.

This building covers an area of 38,500 sq ft and is servicing air brake systems for all freight and passenger cars on the railroad. Portions of the shop are for a wood working shop, for a forge and reclamation department, and for a machine maintenance and tool and die department. Partitions will be erected between the departments. The air brake section replaces twelve air brake servicing points formerly maintained on the railroad. A total of 34 men work on valves, air hose, cylinders, passenger car brakes and other parts of the air brake system. Eighteen men service the AB valves, with an average output of 3½ to 4 valves per day per man. The forge and reclamation section, when completed, will reclaim all usable metal parts such as couplers, hand brakes, brake beams, bolsters, truck sides, etc. The wood mill shop prepares lumber used in car construction.

This building is equipped with two new low-pressure gas boilers with a 5,000 gal underground storage tank to provide stand-by oil for central heating. A third rebuilt boiler is used to consume scrap wood. There are also four electric-powered air compressors with a total capacity of 4,800 cfm; air is piped to all shop buildings.

The new welfare building is concrete block construction with prestressed and precast roof panels. It (*Continued on page 31*)

Extreme forward position of king pin support will take care of 38-ft trailer on this car. Decking is 3 in. planks, and is 10 ft 5 in. wide. Car's length is 40 ft; capacity is 70,000 lb. Adjustable winch equipped with cable and chain can be placed in position along H-beam for tie-down of any length trailer.

Monon Designs New Trailer Hitch

Recent tests of a new type of trailer hitch developed by the Monon shop forces at Lafayette, Ind., have been successful with the railroad planning to convert ten additional cars of its forty-one car fleet.

The original forty cars equipped for trailer loading were converted from low-side fishbelly gondolas beginning in 1955. The two top boards on each car side were removed, leaving one board 9½ in. high. This board is tapered at the top and covered with ⅛-in. steel plate to protect the sides of trailer tires.

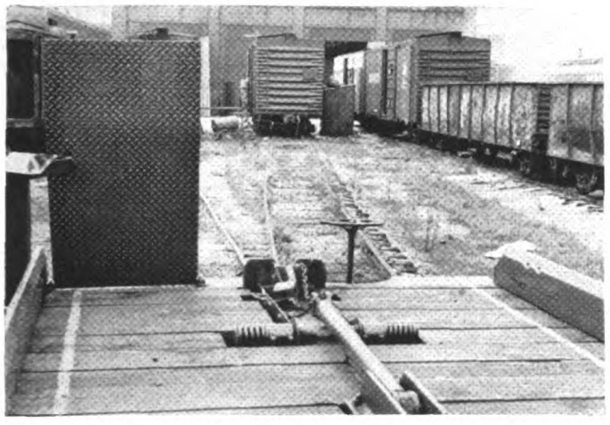
The hitch was developed to simplify the former method of tie-down, and because of the increasing cost to the railroad to replace cables, chains and hooks, which were either lost off the cars, broken, or taken to fasten down trailers on other cars. Loaded trailer tests indicated no need for wheel blocks, which were eliminated together with all winches except two. These are located, one on each side at the opposite end of car from the king pin support. They are each arranged to slide in 5-in H-beams, which are fastened to the outside edges of car, making them adjustable for any length trailer. Each winch is supplied with a length of cable and chain.

The hitch consists of two main parts. The support member is a 12-in., 40-lb channel, 42-in. in height from the deck to top of support plate in vertical position. At the top of channel to support the king pin bearing of trailer, is a 19-in. by 9-in. by ⅝-in. steel plate, and a 1-in. bottom plate, made in box section, with 1⅝-in. space between. This permits insertion of the king pin lock block machined to fit around the trailer king pin. The rear of the top and bottom plate is cut away in a vee shape to clear the king pin when support is raised in position. The lock block is held in place by a 1⅝-in. square transverse toggle pin.

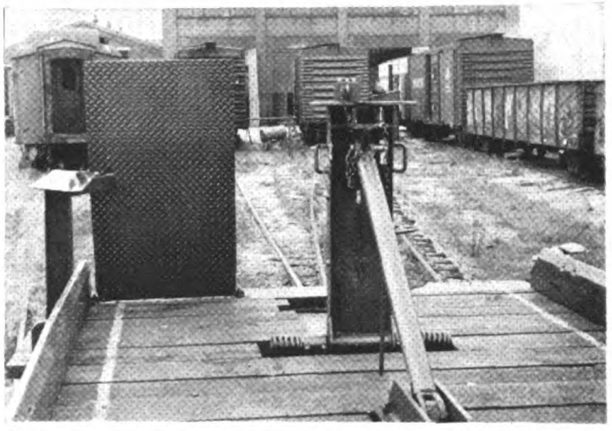
The bottom sides of the channel-support member are built-up to $1\frac{19}{32}$-in. thickness on both sides, with a 1⅝-in. dia., steel shaft, extending outward on each side, and welded to the inside reinforced channel. These shafts fit in bearings 5-in. long, located 22-in. apart for lateral stability, made of ¾-in. plate and welded to a ¾-in. base plate. The base plate is riveted to the bolster cover plate. To provide ease in raising the support in position, one shaft is fitted with a coil spring, under tension when the support is in lowered position. This one spring eliminates one of the dual springs used on the first car equipped.

The diagonal support strut is 3½-in. double extra heavy steel tubing, with a clevis and toggle-pin arrangement at top. The toggle-pin connects the clevis 8-in. from top of support to a steel plate gusset, welded on center line of channel. The clevis on the other end is pin-mounted to a vertical steel plate welded to a 12⅛-in. by 8⅞-in. by 2¼-in. follower plate. This follower slides in a box formed by a bottom plate recessed down $2\frac{9}{32}$-in. between the center sills and a top plate, flush with top of center sill. The two plates are bolted transversely together through 4-in. by 4-in. angles between the center sill. The top plate is riveted longitudinally to angles on each side of center sill. At each end of the follower plate is a rubber snubber, 2½ in. long by 8⅞ in. wide, consisting of two steel plates vulcanized to a rubber insert. This arrangement permits a maximum of 1¼-in. compression to take up longitudinal shock.

The toggle-pins used in the assembly eliminate the use of cotter keys, bolts, etc. When the pin is inserted in place, the end drops



Trailer hitch in lowered position. Equipment will be further recessed on future cars to permit other kinds of loading.



King pin support is spring loaded to provide easy positioning. Diagonal strut base is snubbed by rubber inserts to absorb longitudinal shocks.

down and holds pin in position. Both pins and king pin block are fastened to the support channel by chains to prevent loss. It is estimated the new equipment for each car will cost about $200.00 to manufacture.

The cars are equipped with ASF trucks with snub-up snubbers, 5½-in by 10-in journals, 33-in CI wheels, Stucki side bearings and Miner draft gear. Also included are cast steel bolsters, bottom rotary couplers and drop wheel hand brakes.

C&NW Concentrates at Clinton

(*Continued from page 29*)

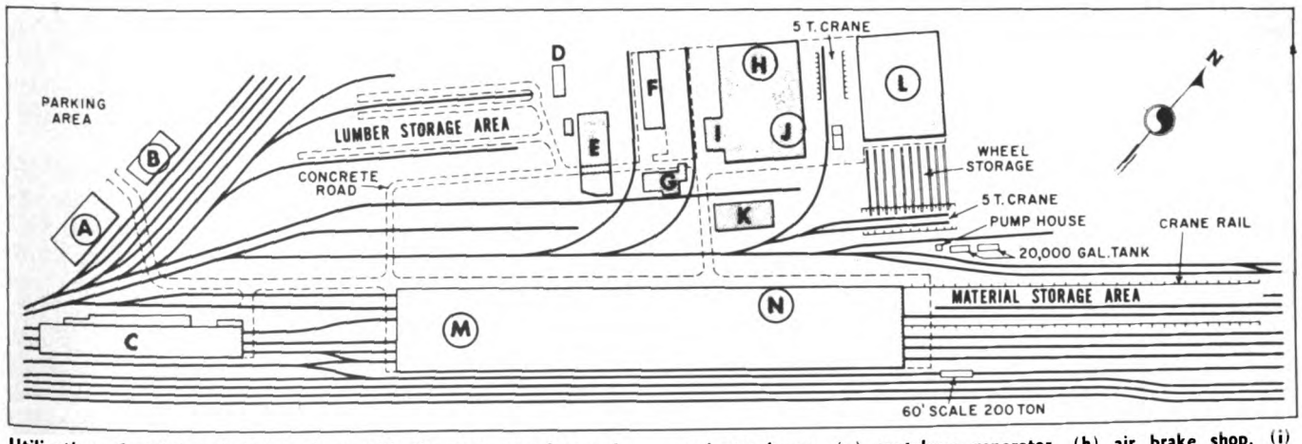
is equipped with lockers, Bradley wash fountains, and showers. Salt glazed tile is used in the washroom. A two-story office building contains offices, drafting rooms, with part of the first floor containing supplies of small parts, such as valves and fittings. The fuel and oil supply pumping station has two 20,000 gal underground tanks, providing fuel for heating the paint shop and for forges, rivet furnaces and heat treating furnace.

An acetylene generating plant has two new Linde generators to manufacture gas from bulk carbide where it is piped to all points in the shop.

Material Handling and Supplies

Over 9,000 items are kept on hand for the various operations. A production and material control system is in operation to provide precise scheduling and coordination of production, purchasing and warehousing. Mechanized material handling techniques are used to the fullest extent. A new fleet of fork-lift trucks is used to handle unit loads, with most suppliers furnishing them palletized.

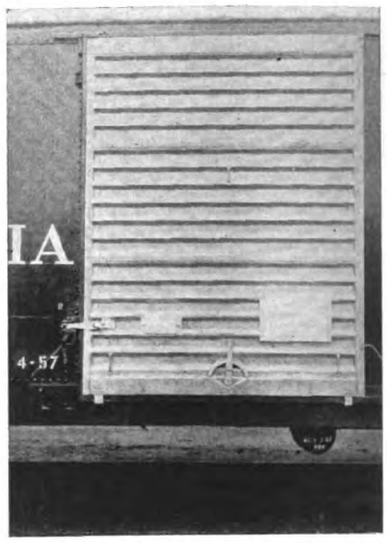
For the first time in the history of the company, lumber is being received in banded units for mechanical unloading, with accompanying reduction from 48 hr to 2 hr in time required for unloading a car. The lumber storage area will be on ground now occupied by the roundhouse. It will be served with three tracks, including one stub, with concrete road ways for fork lift use.



Utilization of existing facilities along with the new car shop and paint shop structures has produced this plant at Clinton. Areas devoted to various operations include (a) template room, (b) template storage, (c) paint shop, (d) garage, (e) power house, (f) office and storehouse, (g) acetylene generator, (h) air brake shop, (i) wood mill, (j) forge and reclamation shop, (k) welfare building, (m) assembly and fabrication shop, and (n) fabricating area. C&NW formerly repaired steam locomotives here.

Pennsylvania Installs . . .

First All-Welded Aluminum Box Car Doors



Corrosion and rust free, this all-welded aluminum door is over 50 per cent lighter than conventional steel units. It was fabricated by the Youngstown Steel Door Co. and applied at Pennsy's Altoona shop.

The first completely welded aluminum box car doors to be built in the United States are in service on the Pennsylvania Railroad. Six of an order of fifty doors developed by Kaiser Aluminum & Chemical Corp., have been applied to existing X-46 box cars and the remaining forty-four are being installed on X-52 box cars with loading devices.

The principal reason for using aluminum is to reduce weight—a factor of increasing importance with the trend to wider doors. Aluminum also gives a door that is not expected to require replacement of parts due to rust or corrosion.

The cars will be used in general service and on captive runs in merchandise service where maximum operating experience will be encountered in frequent opening and closing operations. The actual weight, as designed, of the 8-ft aluminum door is 256 lb as compared with 523 lb for a steel unit. In addition to making the door easier to operate, this weight reduction is also expected to reduce abuse to the door from two standpoints: (1) The light weight will minimize the need for sledges, crowbars and other aids to opening and (2) abuse from road and switch shocks is lessened if the door is left open during movement.

The aluminum material selected for this application is 5086, an unusually strong corrosion-resistant, and highly weldable alloy developed by Kaiser Aluminum. The strength of 5086, which contains magnesium and manganese, is achieved by work-hardening during rolling, rather than by heat treating. This alloy offers greater strength after welding than other common alloys, having a welded joint efficiency approaching 85 per cent.

The door has actual overall dimensions of 8-ft 4⅝-in. by 10-ft 1⅞-in., and consists of three standard horizontally corrugated panels joined to a reinforcing frame of shaped and extruded sections. The bottom and center panel sections are 96 15/16-in. wide by 39 5/16-in. high and contain six 5 31/32-in. corrugations. The top section has five corrugations and is 32 11/32-in. high. A flat surface 1½-in. wide on the sides and 1¾-in. at top and bottom of each section, permits die hold-down and trim during fabrication, and lapped joints with other members in later assembly.

Rivet holes are punched in the corrugated center and bottom panels for the door fixtures. Several ridges of the bottom panel are flattened to provide a recessed surface for the tack board and to facilitate operation of the lifting lever.

The aluminum frame has seven components—front and rear edge extrusions, front and rear vertical reinforcing plates, top and bottom edges and a bottom reinforcing plate. The extrusions are designed to utilize lapped joints with adjacent sheet parts, and to give maximum rigidity and strength to the completed assembly. The design is said to offer a better seal than the corresponding members of an all steel door, and to withstand impact against door frame members when door is closed or opened.

The front extrusion is provided with a flat, reinforcing leading edge to distribute the shock of impact, and to form a seal when the door is closed. A second seal is formed at the edge of the front door post zee by the inner surface of the door frame. A double seal is provided at the rear edge of door by the extrusion, which is designed to slide past and engage a tongue of metal extending from the door post, and a stainless steel sparking strip, 1⅞-in. by 121⅝-in., that extends from slots in a rear vertical reinforcing plate and rests against the top of the metal tongue. The flat surface of the rear extrusion trailing edge impinges at top and bottom against stops when door is fully opened.

The upper edge of the door is formed from ⅛-in. sheet, and the bottom edge is 5/32-in. sheet. The bottom reinforcing plate, formed from a 0.109-in. sheet, runs horizontally along rear of door at the bottom where it completes the covering for the door roller assembly. The lower end of the spark strip is anchored 1¼ in. from the rear by offsetting the reinforcing plate ⅛-in. and raising two ⅜-in. tabs 31/32-in. in from each side.

Assembly of the doors is accomplished in a simple jig arrangement. Standard malleable iron door fixtures are installed with hot-driven steel rivets. Future doors undoubtedly will have forged aluminum hardware. Forty of the doors are equipped with standard steel rollers with lubricated anti-friction bearings. The remaining ten doors, for test purposes are equipped with Zytel "101" nylon rollers, which do not require lubrication or anti-friction bearings.

Possible electrolytic action between the aluminum and ferrous parts on the existing doors is prevented by a coating of zinc chromate primer on the aluminum and a non-lead-bearing primer on the steel and iron. A layer of Alumilastic paste is applied for added protection before joining the dissimilar metals.

The field experience gained through daily use of these fifty cars

(*Continued on page 62*)

SAE Hears About the Possibilities . . .

Fumigation: A Solution to Low-Grade Fuel Use?

The effects of introducing a portion of the fuel charge of a diesel engine into the intake manifold in the form of a fine mist have been investigated by the engineering research department of the Pennsylvania State University. Although small, single-cylinder, laboratory-type diesels were used, results have been such that the Pennsylvania Railroad has tests underway to develop equipment which will introduce fuel into the manifolds of its locomotive diesel engines. This may enable them to burn poorer grades of diesel fuel.

The process of introducing fuel through the intake manifolds is known as "fumigation." Laboratory tests with a swirl-chamber and an open-chamber engine resulted in smoke reductions up to 80 per cent, increased the smoke-limited power output up to 18.5 per cent, decreased specific fuel consumption up to 9.8 per cent, shortened ignition lag, lowered maximum rate of pressure rise, and produced smoother, quieter operation. In running on good grade diesel fuel, approximately 15 per cent of the main fuel proved to be as good a manifold fuel as any. It was also found that a diesel engine could operate satisfactorily on substandard fuels down to 0 cetane number when fumigation was employed.

Maximum benefits from fumigation came when inducting fuel in the form of a very fine mist (not over four microns) produced by "Micro-Fog." As yet an economical method of producing this finely atomized fuel spray in large quantities has not been found. However, significantly improved performance was also obtained by the use of inexpensive pneumatic spray nozzles that require only a small amount of low-pressure air for operation.

Abstracted from "Fumigation Kills Smoke, Improves Diesel Performance," by M. Alperstein, W. B. Swin, and P. H. Schweitzer, Pennsylvania State University. Presented at the recent SAE National Diesel Engine Meeting, Cleveland, November 6, 1957.

The outstanding advantage of the diesel engine is its fuel economy which derives from the facts that the diesel compression ratio is roughly double that of a modern automobile engine and that the diesel can burn a lean mixture which a spark is unable to ignite. In most other respects, however, the diesel is inferior to the Otto cycle engine. In the latter, the fuel and air are mixed before they enter the cylinder, most of the fuel is in vapor phase at the time of ignition; a rather rich mixture can be burned without thermal decomposition. Carburetor engines generally do not smoke. Finally, the spark plug is able to ignite fuels of low ignition quality which, in a compression-ignition (diesel) engine, would ignite too late or not at all.

Fumigation described in this paper represents a little step away from the diesel engine in the direction of the Otto engine, a step which preserves diesel's advantages and alleviates two disadvantages: incomplete mixing of air and fuel, and late combustion caused by long ignition lag.

The method broadly consists of introducing part of the fuel in the form of a fine mist, or fume into the intake manifold while the rest is introduced in the conventional manner through the high-pressure injection system into the cylinder near top dead center position of the piston.

Manifold introduction of fuels into a compression-ignition engine was experimented with at Penn State as early as 1941. In this and subsequent researches, the main fuel was injected into the diesel cylinder in the conventional manner and a smaller amount of auxiliary fuel (diesel fuel, gasoline, alcohol, benzene, etc.) was introduced into the intake manifold as an aid to combustion. Other researchers carburetted alcohol as a main fuel and injected small amounts of diesel oil and various vegetable oils to ignite the compressed air-alcohol vapor mixture. In this manner they successfully burned alcohol which otherwise could not be ignited by compression ignition. A similar scheme was used in the last war by the German air force.

In the last instances the main fuel was introduced through the intake manifold and a relatively small amount of auxiliary fuel injected. But ignition was always released by the injected fuel. In fact, without the injection of a *liquid* jet, the gaseous main fuel would not ignite at all, except at a very high compression ratio.

Recently fumigation of high ignition quality fuels has been used to help burn low ignition quality fuels which, without fumigation, would burn only sluggishly, or not at all.

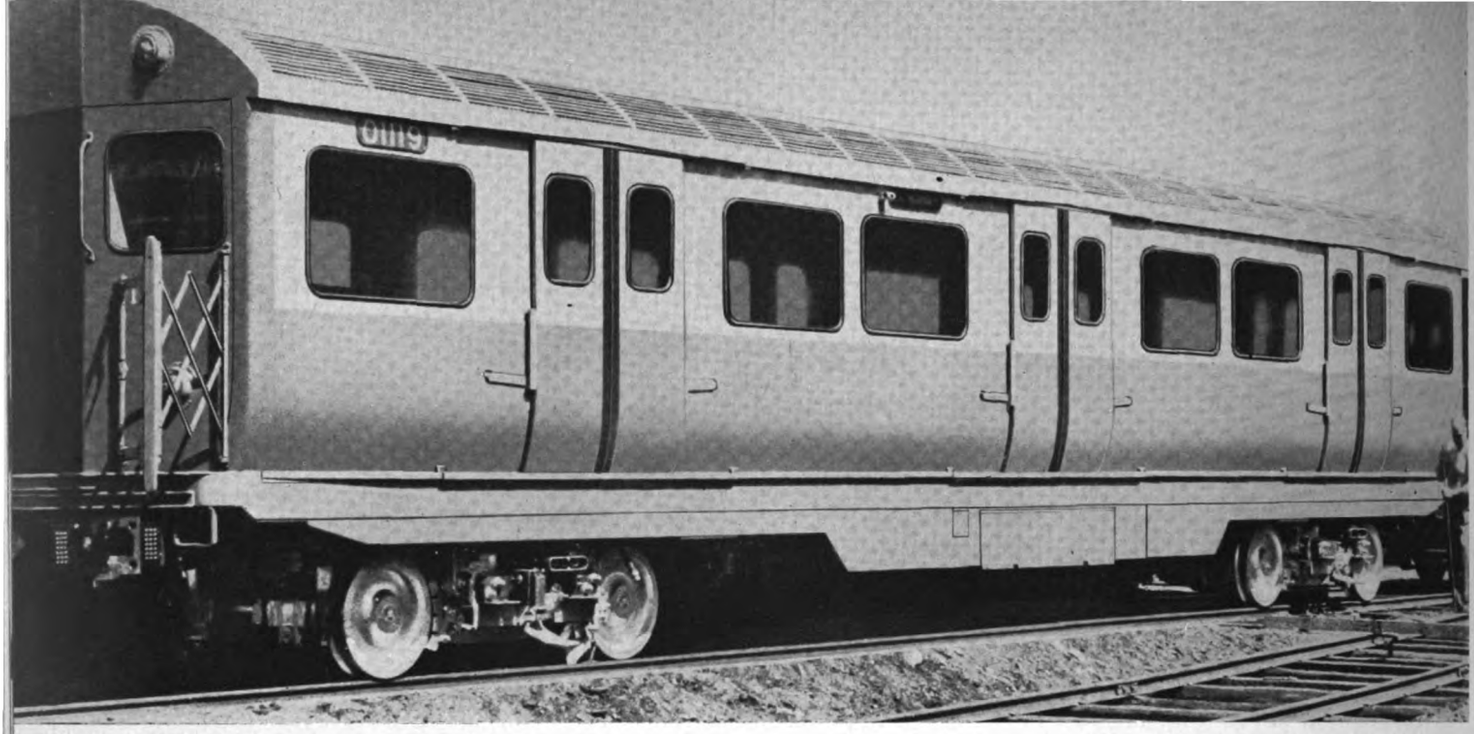
Previous investigators used injection nozzles or carburetors to introduce the supplementary fuel into the intake air. Such devices give rather coarse sprays with a mean drop size of 20 microns or more. The present investigation also employed an apparatus (Micro-Fog) which produces a very fine mist consisting of droplets under four microns. This gave amazingly good results.

Test Equipment

Most tests were performed on a single cylinder CFR cetane test engine and some on a single cylinder Petter AVA-1 diesel engine. Supplementary fuel was introduced by four different methods:

- Mist generator — an experimental model of the commercial "Micro-Fog" lubricator made by C. A. Norgren Company. Liquid is atomized by air jets and is then carried by the air through a series of separator passages where the heavier droplets are removed.
- Pneumatic atomizing nozzle—made by Spraying Systems Company. The fuel rate was controlled by a needle valve, and air at 10 to 15 psi passed through an annulus around the fuel nozzle and imping-

(*continued on page 54*)



Transit Cars Have 'Air Ride' Trucks

Trucks with self-leveling air springs keep cars level and adjust accelerating and braking rates to compensate for passenger load

The first application of its kind to rapid transit service, the Metropolitan Transit Authority of Boston now has 50 new cars built by Pullman-Standard at the Worcester, Mass., shops, equipped with trucks having a combination of coil and air springs. A somewhat similar design of air springs only was used by Pullman-Standard on its New York Central Train-X (RL&C, June 1956, page 53).

The cars will operate in pairs, forming 25 two-car sets. Each car has a motorman's cab at one corner for multiple-unit operation in trains from two to six cars, serving Boston's busiest run between Everett and Forest Hills. An additional order of 25 two-car sets are scheduled for 1958 delivery.

The truck design includes a self-leveling air spring bolster suspension, incorporating a combination of helical springs and rubber bellows. The helical spring in the bellows takes the weight of car unloaded, while the air bellows adjusts to the load and takes the proper height to keep the car level under all operating conditions. This is true whether the car is loaded to capacity, or has only a few passengers on one side or at one end of car. The air spring system actually weighs the car. It automatically adjusts accelerating and braking rates to compensate for the loads.

The trucks are General Steel Castings Corporation's cast steel, four-wheel, inside bearing, non-equalized motor trucks, with a 6-ft 10-in. wheelbase, 5-in. x 9-in. journals, 28-in. solid steel wheels. There are lateral shock absorbers, vertical snubbers and helical journal box springs. Each truck is designed to carry a maximum center pin load of 32,000 lb. Hypoid gears are used in the power transmission. There are four self-ventilated 100-hp. General Electric 1250 motors per car, one motor for each axle.

The motor is a direct-current, series-wound, self-ventilated machine, rated 100 hp for one hour, when operating on 300 volts. Utilization of advanced design and manufacturing techniques gives a greater power output in a smaller size. Comparison with the 100-hp motor now standard on the New York City Transit Authority cars shows the new motor to be 630 lb lighter, 5 in. shorter in overall length, and 5 in. smaller in diameter.

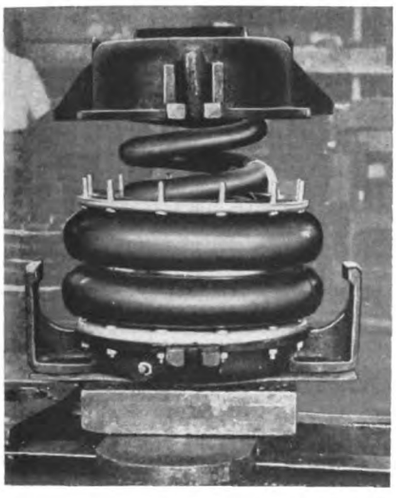
The new motor is essentially the same as the one previously designed for PCC car application, but it has almost double the rating. Along with their MCM controls, these GE 1250Al motors are being used for the first time in transit service.

Electrical Controls

A high-performance, all-electric control was developed for use on the cars. The control is of the motor-cam-magnetic (MCM) type. It consists of magnetic contactors and relays, and cam-operated contacts which perform the car accelerating and decelerating functions.

The cam-operated contacts are mounted on two controllers. These, in turn, are mounted one on each side of the main resistor box. Each controller camshaft is driven through its individual reduction gear unit by its own automatically controlled d-c motor. One controller is designated as the resistance controller. Its function is to change resistance in series with the traction motors. The other controller is

This Spring Levels the Car . . .



Coil springs have capacity of 74,000 lb at 12-in. working height; carry light weight of car. Spring is compressed during assembly.

designated as the circuit controller. Its functions are to establish the traction motor circuits for motoring and braking; adjust traction motor field strength; and connect the traction motor fields for forward or reverse operation.

Electro-pneumatic and extended dynamic braking are used. The electro-pneumatic system includes a unit brake with Cobra shoes applied to every wheel in the train. Maximum use is made of dynamic braking. At a low pre-determined speed, the electro-pneumatic brakes automatically blend in with the diminishing dynamic brakes to bring the car to a complete stop. Electro-pneumatic braking is used also for emergency applications.

The cars are welded, all-steel construction, with curved sides and outside sliding side doors. They are equipped with a third rail shoe equipment, but provision is made for possible future application of overhead pantagraphs. Ventilation is furnished with four axiflow fans per car delivering a total of 12,000 cu ft of air per minute, at maximum speed. The cars are heated electrically by resistance heaters, using the heat generated by the accelerating and braking resistors. The heat is supplemented by 25-kw auxiliary heaters, located in ducts underneath the car. An electronic system provides control of both heat supply and ventilation fan speed.

Each car is equipped with 54 incandescent ceiling fixtures, 23 on each side and 8 on center line, using 20-in. series 36-watt lamps of the short circuiting type, mounted in short-circuiting sockets. Each lamp provides four times the light given in existing cars. Drop sash windows are provided at side of operator and in end door at guard's posts. All other exterior sash are stationary with single light of $\frac{7}{32}$-in. thick safety glass set in rubber moulding.

The interior color scheme presents a striking appearance through use of decorative green, coral, tan and brown plastic materials and stainless steel in combination with limited painted surfaces of oyster white and terra cotta. The plastics are easily washed, and since the colors are built into the materials, maintenance is easy. The head-lining is $\frac{1}{8}$-in. solid micarta, green mottled design, with stainless steel snap-on mouldings.

Advertising cards are framed with stainless steel mouldings. Inside window frames are integral moulded units of medium green re-inforced plastic from side finish in window area. Stainless steel snap-on vertical mouldings are used at joints. At the side door openings, the pier panels are provided with cream-colored melamine surface phenolic board, the upper portion of which provides an 'order of station" sign.

Longitudinal seats are used, with spring cushions and padded backs upholstered with heavy-duty vinyl of alternating coral and turquoise. The seat frames are stainless steel provided with louvers and form part of the heating and ventilating duct system.

The cars are each 55 ft over the pulling faces. Overall height is 11 ft 11-in., and width is 8 ft 11¾-in. Seating capacity is 48; standees are rated at 179. The empty car weighs 58,550 lb and when loaded with 227 passengers it will weigh 90,250 lb.

Manufacturers Supplying Specialties and Equipment

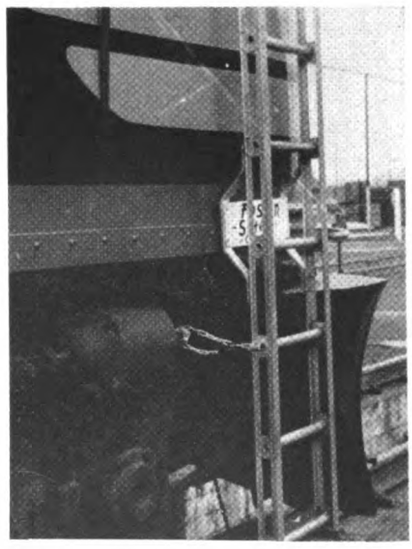
American Steel Foundries	Contact shoes
Bethlehem Steel Company	Wheels and axles
B. F. Goodrich Co.	Floor covering
Consolidated Metal Products Co.	Door control equipment, auxiliary heaters, 600-volt switch panels
Dana Corporation	Hypoid gear units and propeller shafts
E. I. DuPont de Nemours & Co.	paint
Electric Service & Manufacturing Co.	Tail lights and defrosting fans
Ellcon Company	Door hangers and handholds
General Electric Company	Motor and control equipment
General Steel Castings Corp.	Truck frames
Heywood-Wakefield Company	Seats
James L. Howard & Company	Miscellaneous door hardware
J. W. Mortell Co.	Undercoating
Lovell-Dressel Co.	Marker lights
Luminator, Inc.	Car body and emergency lights
Minneapolis-Honeywell Regulator Co.	Heating and ventilator controls
National Brake Co.	Hand brake
Ohio Brass Company	Coupler and draft gear equipment
O. M. Edwards Co.	Motorman's side sash and doors
Railroad Friction Products Co.	Cobra brake shoes
SKF Industries	Journal boxes
Thomas A. Edison Co.	Storage battery
U. S. Plywood Company	Micarta headlining and steel-faced plywood floor
Westinghouse Air Brake Company	Air brake equipment
Westinghouse Electric Corporation	Roof ventilating fans and 32-volt switch panels

PROBLEM PAGE

Cleaning Road Locomotive Windshields

What have you found is the most successful way to clean the windshields of streamlined road passenger and road freight locomotive units? Should units be equipped with ladder brackets and handholds? Should cleaning be done from trackside platforms? Can it be done from the ground? Should intermediate division points do job in a different way than terminals?

Burlington units have runboard and ladder built on them to facilitate cleaning.



USE ALUMINUM EXTENSION LADDER. Where trackside platforms are not available, the most successful method found by one western railroad for cleaning windshields of diesel road locomotives is an aluminum extension ladder angled at the top to suit the curvature of the nose.

It is fitted with handrails at the top to assure the cleaner's safety in alighting from the ladder to clean the windshield. The ladder is clipped on to a handhold mounted on the nose close to the windshield and held close to the side of the locomotive at the lower end by a safety chain which can be fastened to a lug on the air-brake cylinder.

PUT BRACKETS ON DIESELS, *by S. L. Fee, vice-president—operating department, Chicago, Burlington & Quincy, Chicago.* We feel the best method for cleaning windshields both at terminals and intermediate points on road passenger and freight locomotives is washing with hot or cold water, depending on the condition of the windshields, and wiping with towels.

Locomotives should be equipped with ladder brackets and handholds. Windshields cannot be properly cleaned from the ground.

Track-side platforms are not considered necessary, particularly if units have been equipped with the ladder brackets and handholds.

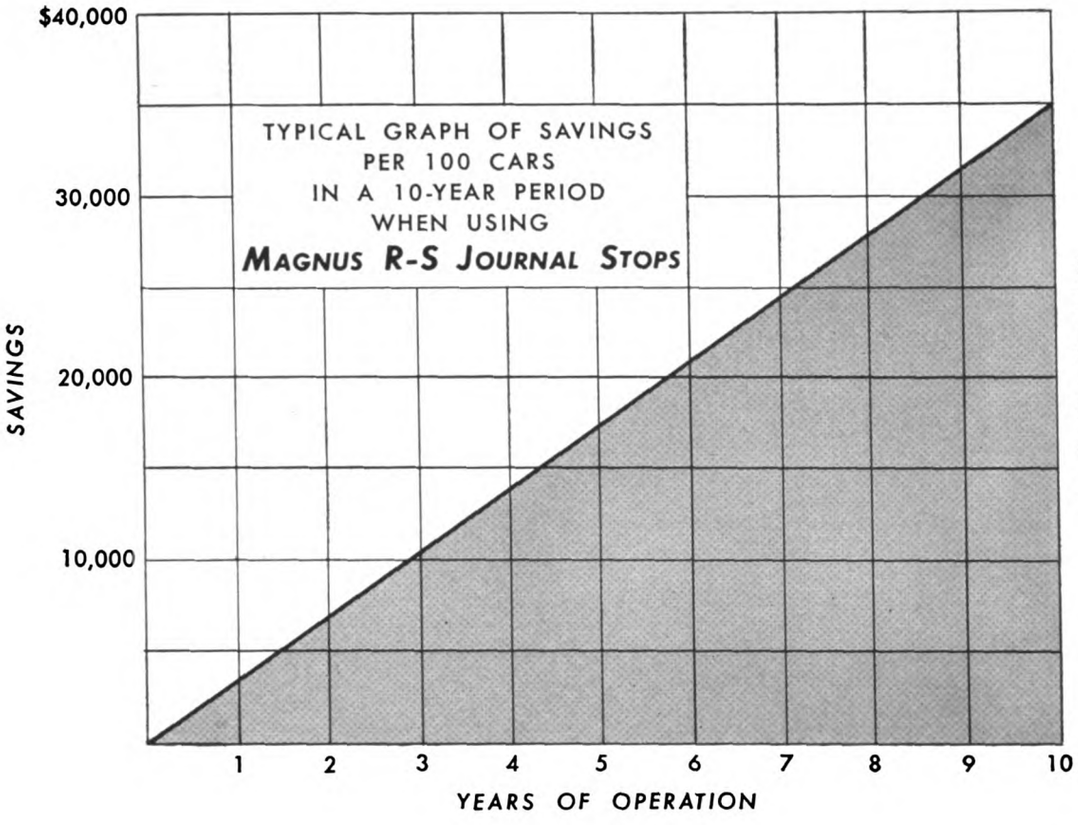
•

NON-SKID TREAD HELPS. Northern Pacific has ladder brackets, handholds and non-skid treads on the tops of the noses of its road locomotives to give easy, safe access for cleaning the windshields. This has proved quite satisfactory on road locomotives going through where crews change, or at diesel repair points where raised platforms are not available.

•

SOAP-AND-WATER DOES THE TRICK. Southern Pacific, San Francisco, reports that windshields on stream-lined road passenger and road freight units are cleaned with soap and water from trackside platforms at maintenance terminals. Units are equipped with ladder brackets and handholds to facilitate cleaning at intermediate division points. This does necessitate the use of a ladder, and man must climb up on the nose of the locomotive, the construction and contour of which does not permit cleaning windshields from the ground.

TAKE A GOOD LOOK AT JOURNAL-STOP SAVINGS



Savings determined solely on basis of reduced out-of-pocket expense in bearing assembly maintenance—with no consideration or value applied to increased car availability and greater car utilization, which R-S Journal Stops should make possible.

An investment in Magnus R-S Journal Stops will save you over $35.00 per car per year — will return the complete cost of the Stops in less than 3 years.

WHEN YOU BUY a new freight car, you're interested not only in first cost — but how much you will have to spend to keep it on the go for the rest of its useful life. Let's project the *journal bearing costs* for a 10-year period to see:

Total operating cost for solid journal bearings in freight service is $81.37* per car per year. But when you install Magnus R-S Journal Stops, you cut annual operating and maintenance costs to $46.12* per car. That's a *saving* of about $35.00 per car per year. You pay the complete cost of R-S Stops and installation in less than 3 years—get a $350.00 return for a $105.00 investment in only a 10-year period.

With Magnus R-S Journal Stops you stabilize the solid bearing assembly — give the bearing a chance to perform at optimum efficiency of which it is inherently capable. You reduce hot boxes, cut routine service attention, double bearing life, reduce wheel flange wear, and eliminate false brake piston travel. Equip all freight cars with R-S Journal Stops — and railroads will save $70,000,000 per year in freight car operating costs.

For complete information on the low-cost way to get better bearing performance, *and fast*, send for "Design and Performance Data on Magnus R-S Journal Stops", Magnus Metal Corporation, 111 Broadway, New York 6; or 80 East Jackson Blvd., Chicago 4.

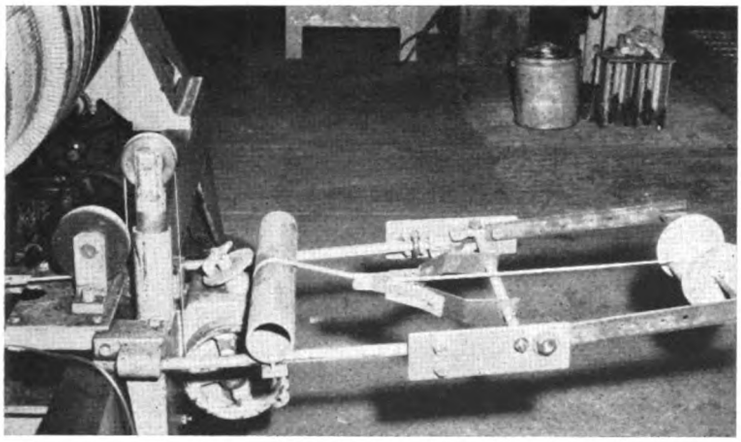
**Cost based on data compiled by the Mechanical Division of the Association of American Railroads in 1955 as revised by the Technical Advisory Committee of Bearing Manufacturers to correct for bearing consumption.*

MAGNUS

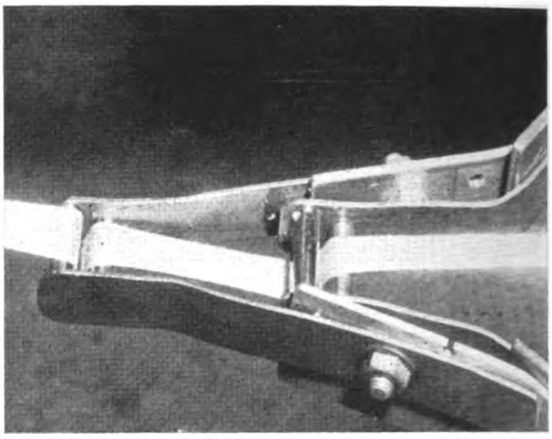
Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

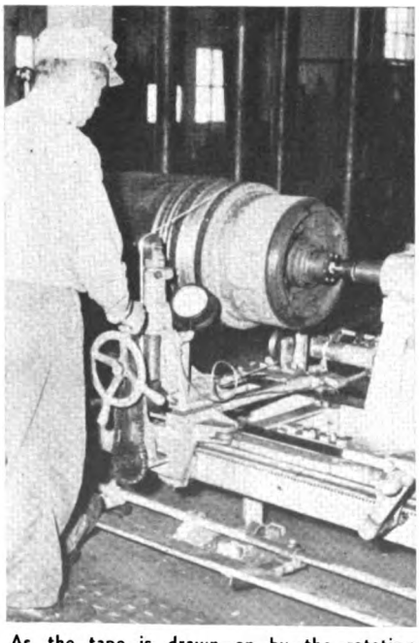


Tape from the spool goes through straightening device, over the pipe, down under and around tension wheel, over wheel on the tension measuring piston, under two guide pulleys, only one of which is shown and over a third from which tape is fed on to the armature. Above: Straightening device, made with smooth fixed pins but no rollers, insures the tape going flat onto the armature.



Glass Tape for Armature Banding

The Milwaukee now has about 40 traction motor armatures in service on which glass tape has replaced steel wire for banding and is adding two per week.



As the tape is drawn on by the rotating armature, it is fed in even laps by the operator who moves the machine carriage laterally with the hand wheel.

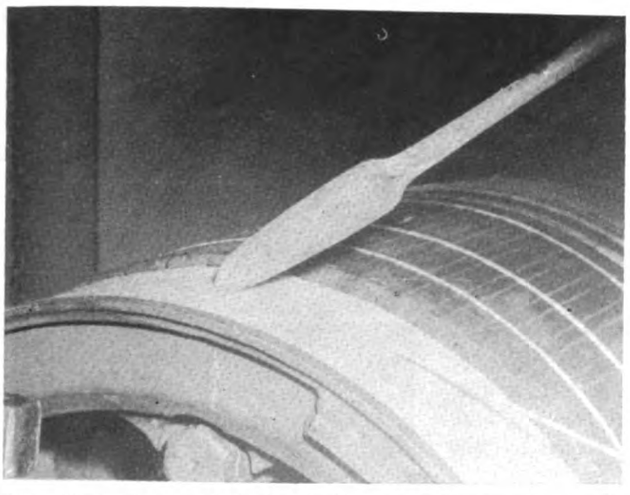
WORK NOW BEING DONE in the Milwaukee, Wis., shops of the Chicago, Milwaukee, St. Paul & Pacific indicates that traction motor armatures stalled in a snarl of banding wire may become a thing of the past. Steel banding wire is being replaced with glass tape and there is every indication that costs will be reduced, insulation will be improved and that the life of armature coils will be extended. Of course, the magnetic effects of the banding wire will be eliminated.

The tape consists of parallel glass fibers in self-polymerizing varnish. The Milwaukee's device for applying the tape is a converted banding machine. Tape from a spool is first drawn through a straightening device to assure its being applied flat. It then passes over 65 per cent of the surface of the tension wheel on the tension device originally designed for banding wire.

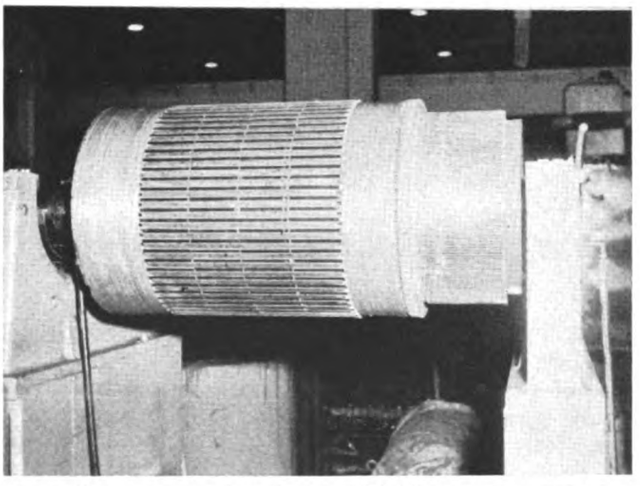
From the tension wheel the tape is run over a pulley on the end of a piston in an oil-filled cylinder. This develops oil pressure which registers in pounds tension on a gage in front of the operator. Finally, the tape goes over a guide pulley onto the armature. The pulleys are crowned and flanged.

For applying the tape, the operator moves the machine carriage horizontally as the tape is wound onto the armature. Four layers are applied at a tension of 125 lb on each end of the armature or enough to use one spool of tape per armature. The tape shrinks seven to eight per cent on curing, which insures added tightness.

The tape used is supplied by the Chicago Printed String Company, and is known as CPS Res-i-glas. It is made of Owens-Corning, nonwoven, parallel glass yarns impregnated with General Electric Perma-



When the band is complete, the trailing end of the tape is secured by a touch of a hot soldering iron.



A finished armature after dipping and baking complete with glass bands including the string band.

fil polyester. The trailing end of the tape is secured initially by touching it with a hot soldering iron.

No insulation is used under the glass bands. The tape bonds to itself after 20 minutes at 125 deg C, with complete cure effected after baking for three hours at this temperature. The applied tape conforms with irregularities of the coils preventing chafing of the coils under the bands.

Balancing is not a problem since most balancing is done at the ends of the armature. For armatures, other than traction motors, balancing weights may be secured to the tape in the form of lead shot or lead sheet held in place under a patch of glass tape.

After taping, armatures are dipped in GE9700 varnish and baked eight hours or overnight at between 250 and 300 deg F.

The tape is also applied by hand for string bands at the outer end of the commutator.

From the Diesel Maintainer's Note Book

Remember Number 5

By Gordon Taylor

A GP-7 UNIT was dispatched from a secondary maintenance point as a single-unit locomotive in freight service. Everything was apparently in good order. However, before the unit moved five miles, it was in trouble. The engine would insist on stopping in the No. 5 throttle position.

The crew did not remember how to handle such a case. Probably the road foreman had failed to advise them how to meet such a situation. In any event, the crew phoned the roundhouse, from which they had so recently departed, for a relief engine.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

Just at that point, it would have been a fine thing if the foreman or maintainer could have suggested something that would have cleared up the trouble. Helpful ideas seemed to be missing that night, so preparations were made to run a relief engine.

The crew, having to wait so long for another engine, started experimenting with the defective engine. The fireman started the engine and, operating it from the layshaft, found that the engine could be speeded up, and seemed to have gotten over its scare of throttle No. 5. In other words, the trouble seemed to have disappeared but, since the crew did not know what they had done to correct the trouble, they did not wish to proceed with a unit that might fail again.

In the meantime, the relief unit had arrived and proceeded with the train. The defective unit was operated under its own power back to its dispatching point.

At the roundhouse, it was carefully inspected, but nothing definite could be found to explain the delay. Arrangements were made to operate the unit a full shift in yard service to see if it would fail. That test revealed no trouble, so the next night the unit was dispatched in road service and made a successful trip.

(*continued on page 52*)

How Does Environment Affect Brush Operation?

THE PERFORMANCE OF BRUSHES is known to be related to the presence of a constant film of moisture on the commutator. In engineering terms, this condition is known as the Beilby layer theory. Under the conditions to which brushes are normally subjected, this film exists on commutators until the relative humidity or moisture content of the atmosphere drops to a level less than 5 per cent. This condition is practically non-existent in railroad operation. However, there is evidence to indicate that brush performance is improved by higher relative humidity because of better commutator filming.

Heat is a factor which tends to reduce the effect of atmospheric moisture by raising the minimum relative humidity level at which a moisture film will be retained on the commutator. Fortunately, in railroading it is doubtful if sufficient temperature is ever encountered to cause this condition; certainly not under normal commutator temperature conditions.

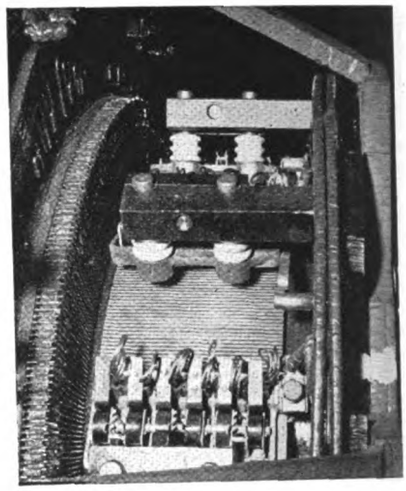
Dust of a non-conductive type causes brushes to wear rapidly when it can enter the machine as is usually the case in severe dust storms. It destroys the commutator film and can thus be responsible for brush chatter and breakage, and possibly flashovers. Conductive dust of a magnetic nature such as iron ore can cause flashovers and commutator trouble from short circuited bars in addition to those troubles associated with non-conductive dusts.

Corrosive gasses such as sulfur, coal smoke, chemical fumes, etc., are harmful to commutator films. They can result in excessive film formation leading to smutted and burned bars, or film stripping leading to commutator ridging and threading.

This is the ninth of a series of questions and answers which are appearing each month.

Oil vapor pulled through the machine with the cooling air inevitably deposits a dust collecting film on the commutator, risers, and other internal parts. Normally the very slight amount of copper or carbon dust present at any given moment in a commutating machine is efficiently carried out by the cooling air. However, if the risers and other parts are coated with an oil film, the conductive particles build up thus providing an excellent pathway for a ground at any point where the insulation may be cracked. On the commutator, the presence of an oil film can cause the gradual formation of a lapping compound composed of dried oil and dust. Particles are sloughed off the brushes and commutator as dust in normal operation but these particles mixed with oil vapor make a lapping compound similar in effectiveness to jeweler's rouge. This material is sometimes responsible for the grooving and threading encountered on a given machine equipped with a brush grade that is performing satisfactorily on other similar machines in the same unit pool. The oily mixture can also cause bar burning by short circuiting between bars. This is one known source of 180-deg bar burning. Rather than tolerate the expense (and potential source of brush trouble) connected with spraying and drenching the machine with solvent to remove the oily film, it would seem more economical in the long run to prevent the entry of oil vapor.

Altitude conditions as indicated by reduced barometric pressure are known to be destructive to the normal type of brush intended for use on land or sea-borne equipment. However, the effect does not become evident, so far as present knowledge indicates, until an altitude of approximately 30,000 feet is reached. Altitude failure of brushes is attended by a sudden



explosive dusting of the brushes at the commutator face and a rasping grating noise as of terrific friction. It is known that the absence of water vapor at high altitude will cause this condition with standard sea-level brushes. Because of the fugitive nature of moisture in brushes, brushes intended for high altitude use are specially compounded to contain a substitute for the filming properties of moisture. There is one point to be borne in mind in the event it seems like a good idea to try a high altitude treated brush grade on diesel equipment. The friction of these brushes is low at altitude, but very high at sea level. The writer knows of one case where an altitude treated grade was placed on a main generator and the solder was promptly thrown out of the risers as the result of the high commutator temperature arising from high brush friction. Based on our present knowledge, there appears to be no reason to consider altitude as one of the major variables affecting brush performance on diesel electric locomotives.

By K. R. MATZ
National Carbon Company

5 Roll Them Out Like New

Cleaning Electric Machinery

The relative values of bucket and brush, spray cleaning and vapor degreasing. The subject of cleaning will be concluded in the next issue.

Valuable Lessons

OF ALL THE VARIETY of cleaning equipment, what could be simpler than a bucket and brush? Yet this pair shows up many of the basic problems which the more complex equipments attempt to solve. Here we can learn valuable lessons that will help us judge the effectiveness of other cleaning apparatus.

Although they are simple, the bucket and brush are often misused—with harmful results. As with most simple tools, good results depend upon understanding and skill. Properly used, this pair is a remarkably effective cleaning tool. The main point is to keep the dirt from getting into the clean solvent in the bucket. One way to do this is to brush on the clean solvent from the bucket, and let the dirty solvent drain off into another bucket or wipe it up. Remember, dirty solvent can carry dirt into otherwise clean places and when it dries it leaves the dirt behind. This can be destructive, especially if the dirty solvent soaks into insulation surfaces, such as porous putty, string bands, insulation fabric, or the cracks in insulating varnish. Dirt in these places is the "stepping stone" path that allows electricity to leak across the insulation, and you've already found out what that means.

The danger from the use of dirty solvent is very real. There are cases on record of equipment that operated without failure up to the time of mileage overhaul in the shop. Shortly after the equipment was returned to service the armatures failed—each in the same way. Paths were burned across the insulation from the commutator to the steel band holding the winding in place. In some cases the steel wire of the band was burned through. This meant that, in addition to the rash of ground relay trips and flashovers, some armatures lost bands and windings. The trouble was a nightmare to the shop. No explanation was found until the cleaning solvent was examined. It was discovered to be loaded with conducting dirt, having been used over and over without filtering or distilling. A simple test showed what this meant. A paper towel was folded into a cone and filled with the solvent. After the liquid had drained through, a dirty deposit remained on the towel. Measurements showed that this deposit had a low resistance. When a pair of high-potential testing leads was touched to the surface

(*continued on page 44*)

This is the fifth article in the series covering heavy maintenance of locomotive electrical equipment.

Part 5 is written by J. W. Teker, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.

Fig. 1—The simplest form of cleaning equipment.

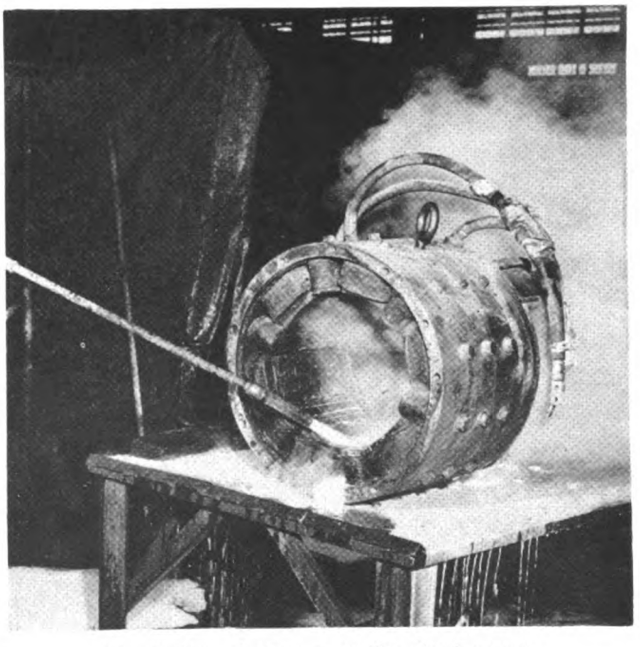
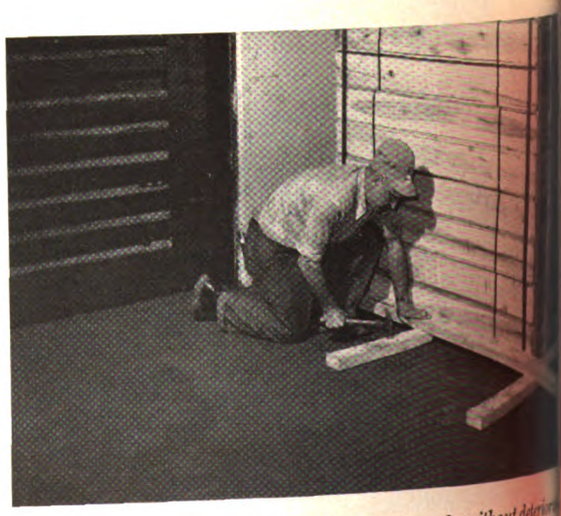


Fig. 3—Use of steam spray for cleaning parts.

Sign of progress

The stencil that means better lading protection and reduced Cause F loss and damage claims for progressive railroads.

The first box car (1948—Chicago & North Western) and the first gondola (1945—DT&I) equipped with N-S-F.



N-S-F *takes repeated nailing of blocked loads without deterioration or leaking. Keeps more Class A cars rolling.*

OVER 60,000 FREIGHT CARS EQUIPPED WITH N-S-F® IN JUST 12 YEARS!

The rapid acceptance of NAILABLE STEEL FLOORING in the past twelve years is a tribute to the progressive spirit of America's railroads. Today N-S-F, the *original* NAILABLE STEEL FLOORING, is in use in the new and rebuilt rolling stock of 62 leading carriers, delivering savings on maintenance costs, operating costs, and damage claims, and giving better customer service.

N-S-F helps railroads in many ways. For example, it improves car life—N-S-F gives the car greater structural strength from the underframe up. N-S-F substantially reduces floor damage and repairs by standing up to the concentrated loads of lift-truck operations. N-S-F increases the availability of Class A cars, and permits more flexible use of the equipment.

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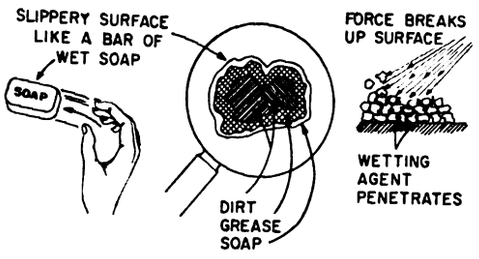

Fig. 2—How alkali cleaner removes dirt.

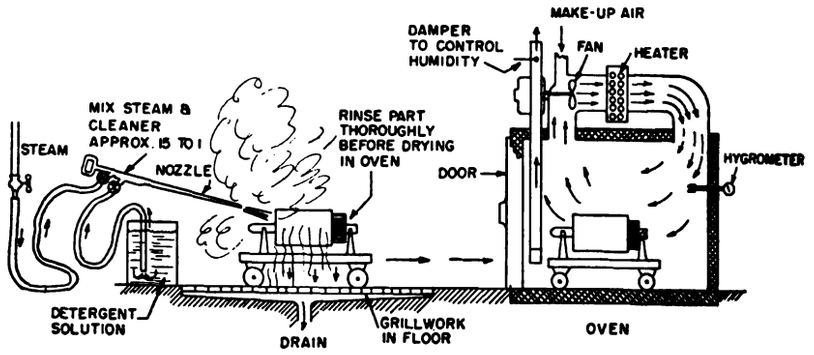

Fig. 4—Typical set-up for cleaning electrical machinery by washing and drying.

it broke down immediately, and the path between the points burst into flame.

Because it is so easy, there is a strong temptation to dunk the part being cleaned in the bucket or tank and let the dirt soak off. This may be fine at the beginning, but the reckoning comes at the end. Just when the solvent should be cleanest it is dirtiest. You can avoid this by changing from one bucket to another until the solvent drains off clean. But it takes a lot of solvent to keep the dirt concentration low enough. This points up another principle in cleaning: find a way to remove the dirt and use the same solvent over and over. Some methods use this basic principle.

The brush can speed up cleaning by supplying mechanical force to help the soaking off process. It pushes and scrubs through dirt layers so the solvent can penetrate. Here is another important factor to look for in other cleaning equipment and methods.

While the bucket and brush method is simple and effective, it has limitations. The process is painstaking, messy and slow. The workmen are in close contact with the solvent. There is the hazard of fumes that may be explosive or poisonous. Some safety and insurance codes prescribe the kind of bucket that must be used. This may be a metal container with a close-fitting hinged lid, Fig. 1. The opening is covered with a depressible screen which must be pushed down to reach the solvent.

Spray Cleaning

One widely used method of cleaning insulation is to spray with solvents. The solvent is combined with compressed air through an aspirator and blown against the part to be cleaned. Remember the bucket and brush lesson, and watch out for good drainage of the dirty solvent away from the parts being cleaned. Be especially careful to provide good ventilation. This is important when the work is done in a confined space.

Where climate and conditions permit, spray cleaning may be done outdoors. Even here, however, suitable precautions should be taken to protect the operator. Plastic helmets, like those used by divers, are available. These are fitted with a hose supplying air for breathing. The air should be pumped from a source far enough away from the operation to insure that it is free from fumes. The same clean air can be used for operating the spray gun. The arms and hands should be protected, and suitable clothing worn to keep the solvent from getting into the skin.

It is the presence of grease or oil that usually causes dirt to cling to insulation or metal parts. In general, the petroleum and chlorinated types of solvents dissolve the grease and oil, and the dirt floats off with it. When dirt is mechanically bonded to or imbedded in the surface, the solvent can do very little to move it. The blast of air and force of the liquid may, however, help move some of the looser dirt particles.

Washing

Scrubbing with plenty of soap and hot water is a time-honored method of cleaning locomotives as well as small boys. It obtained widespread popularity in the days of steam engines and is still favored in many railroad shops. It can handle a much larger volume of work than the little bucket and brush. Its effectiveness depends upon the heat and force of the water to soften the hardened grease and speed up the chemical activity of the cleaner. An alkali cleaning agent, such as the sodium phosphates, silicates or hydroxides is used. This reacts with the grease to form a layer of soap around the particles and gobs of dirt. This makes the particles of dirt just about as slippery as a wet bar of soap, Fig. 2. They no longer stick to one another or to the surface, and are easily removed by the hot water.

Various wetting agents and emulsifiers are added to the cleaning agent to make it more effective. While the wetting agents used are usually trade secrets, they all serve to make the water penetrate. Sometimes water will just roll off a dusty surface, especially if it is at all greasy. The wetting agent makes the water stick and soak in. The purpose of the emulsifier is to break the grease into small particles so it can float off with the water.

This washing solution can be used in a number of ways. The simplest method is to have a large tank filled with hot water and cleaning solution. The parts to be cleaned can be dropped in and left to soak until the dirt and grease float off. This is likely to be pretty rough on insulation, and is not recommended for electrical parts. However, it is effective on steel parts and has the advantage of requiring little labor.

For cleaning insulation it is preferable to spray the water and alkaline cleaner, using steam or air. Steam under pressure is usually combined in a nozzle with a suitable cleaning solution and the spray direct against the part to be cleaned, Fig. 3. The steam, water and cleaning agent work together to loosen and remove the dirt. Solutions for this purpose are usually

(*continued on page 46*)

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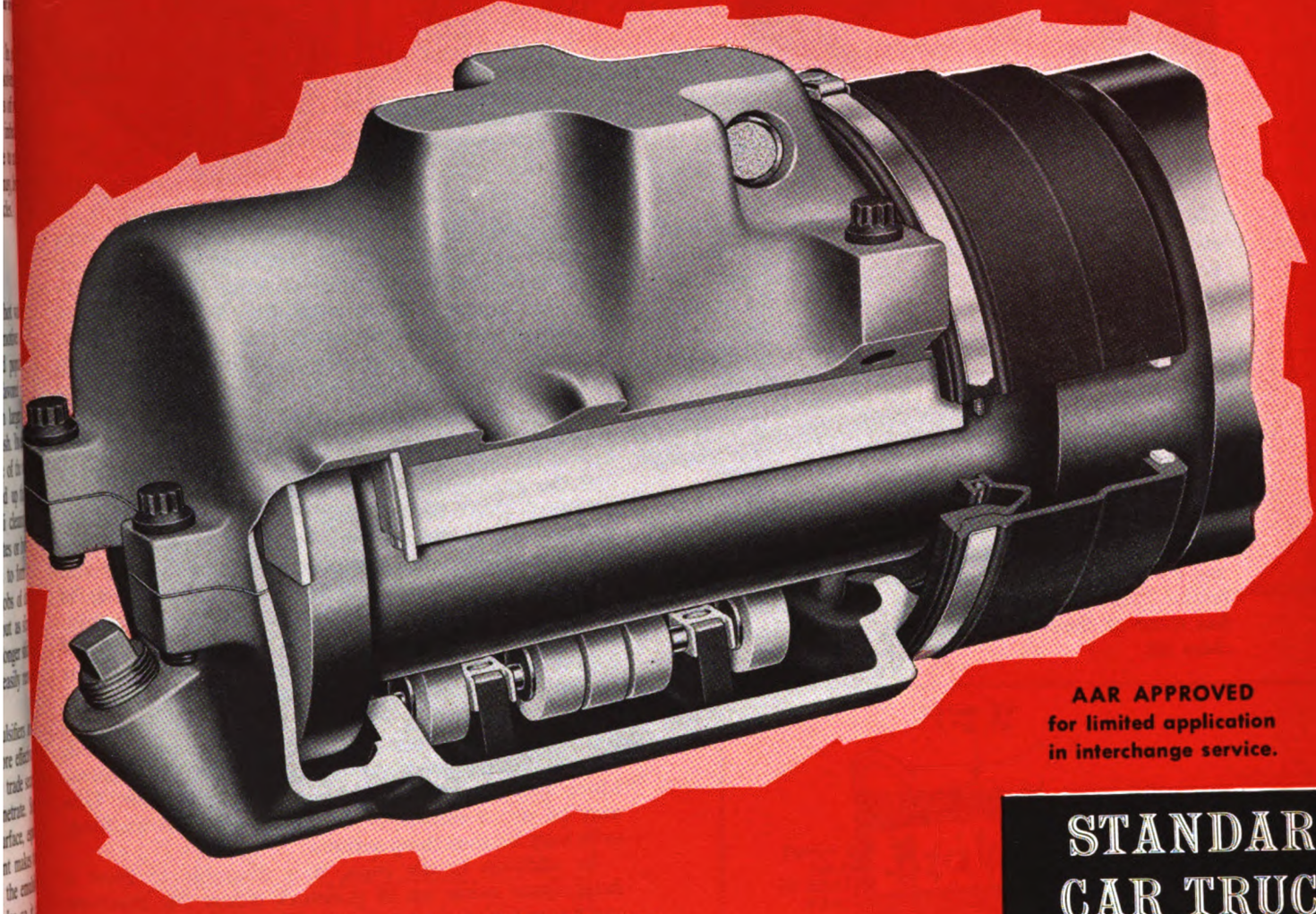

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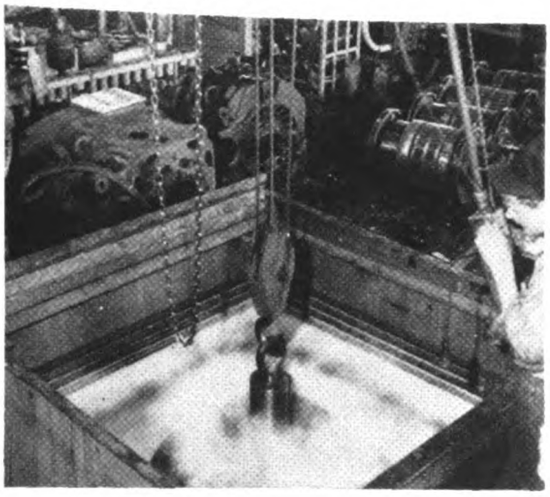

Fig. 5—Vapor Degreaser in use.

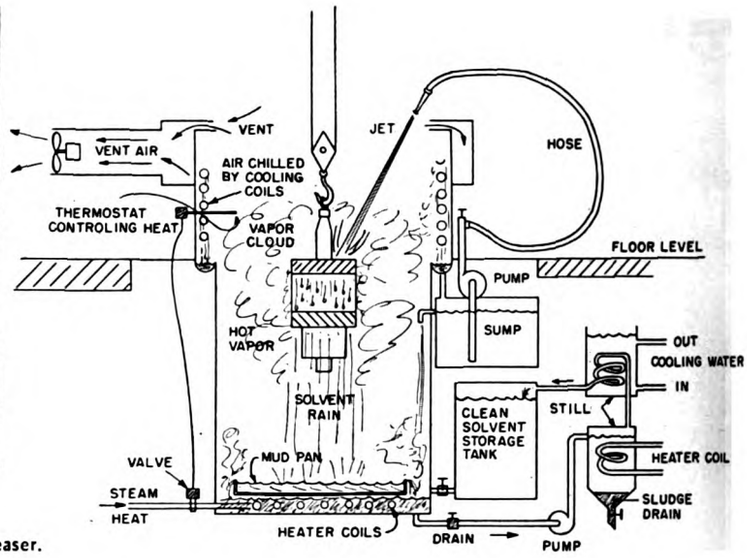

Fig. 6 (At right)—Schematic arrangement of a vapor degreaser.

made up in a barrel or vat, using selected detergents, alkalies or soaps. A hose connecting to the steam nozzle sucks the solution up and it is mixed with hot steam. After the cleaner has done its work the insulation should be sprayed with clear hot water and steam to completely rinse off the alkali. This is important because any of the cleaner left behind, even as a dry powder, will be a hazard. If this residue should later absorb moisture from the air or get wet it will become a good conductor of electricity and could cause electrical breakdown of the insulation.

Just as was the case with solvents, we are still looking for the perfect cleaner. The properties desired are ability to wet and penetrate, and ability to scrub and emulsify. Yet, at the same time, the cleaner should remain chemically and electrically neutral. Each cleaner has some of these properties, but no one cleaner has them all.

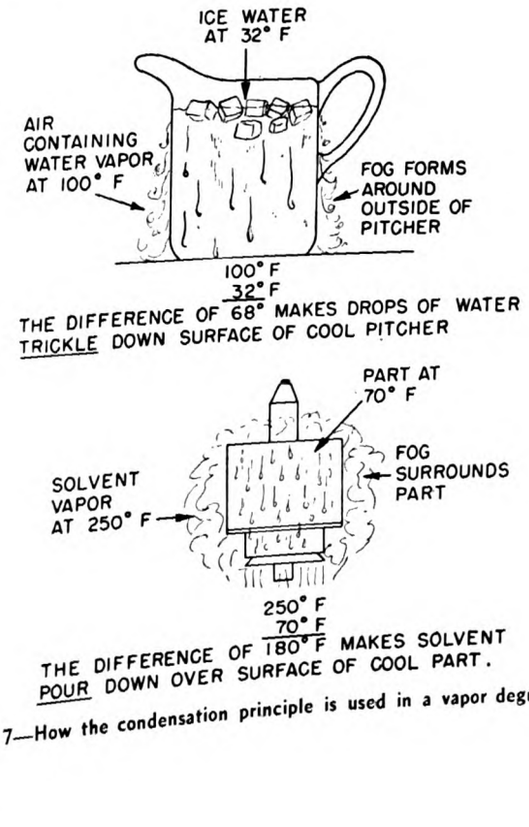

Fig. 7—How the condensation principle is used in a vapor degreaser.

Regardless of the cleaner used this method wets or soaks the insulation. The machine must therefore be thoroughly dried out after cleaning. This is usually done by heating it in an oven, Fig. 4. Such an oven should be ventilated to carry the moisture away. Otherwise the hot air will become saturated with water vapor and the part will not be dried out. Drying time depends upon the size of the machine, but usually takes several hours. Insulation resistance should be measured from time to time during drying, and the process continued until a constant reading is obtained. Don't be surprised to see the insulation resistance fall as the machine heats up in the oven. It will start to rise when the moisture begins to be driven off. This rise should continue until the machine is dry. Then the insulation resistance will become steady. Even this value may not be as high as you would expect because ordinarily a hot machine has lower insulation resistance. You may expect a big improvement in the reading after the machine cools off. If the value remains low after the machine has cooled, it may be necessary to repeat the drying process. More likely, however, there is an electrical fault. This may be just a dirty spot that was missed in washing, or it may be something serious.

In addition to the oven, it is desirable to have a floor space made up of grillwork where the machine can be set for steam jet cleaning, Fig. 4. This allows the spent water and dirt to drain off so the operator does not have to stand knee-deep in hot water. As an additional convenience, the work may be placed on a car running on a track. After cleaning and rinsing it can be easily pushed into the drying oven. Where shop steam is not generally available a small, portable flash boiler can be used. In some cases local ordinances or state laws may require that the drainage be treated to meet water pollution requirements.

While steam jet cleaning is old it is still very popular with many shops and maintenance men. The force of the steam is good for moving large accumulations of dirt, and for reaching into pockets and cleaning them out. Its chief drawback is that the insulation is soaked and time is consumed drying it out. This is

(*continued on page 50*)

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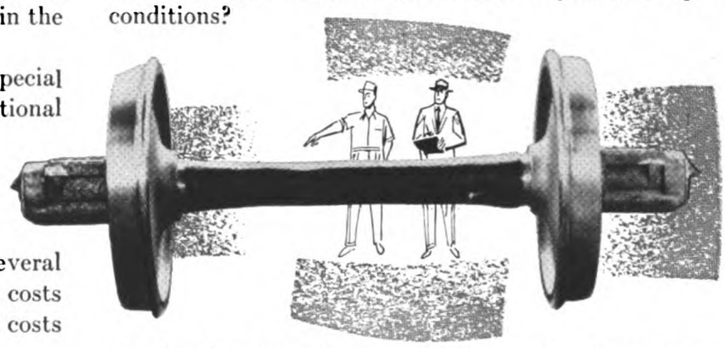

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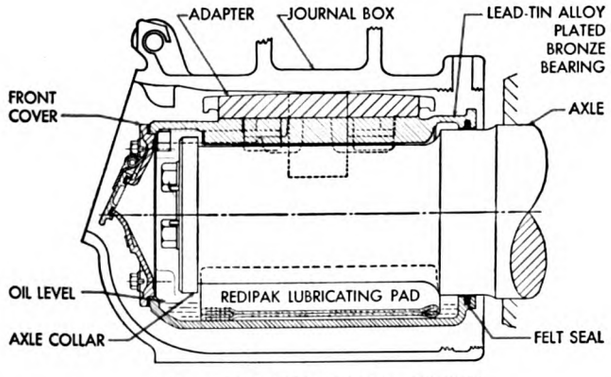

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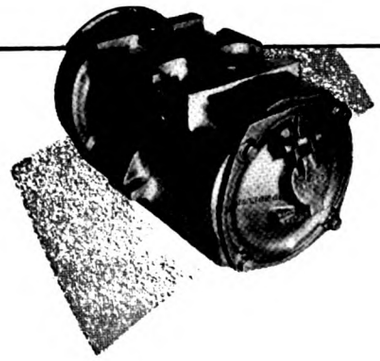

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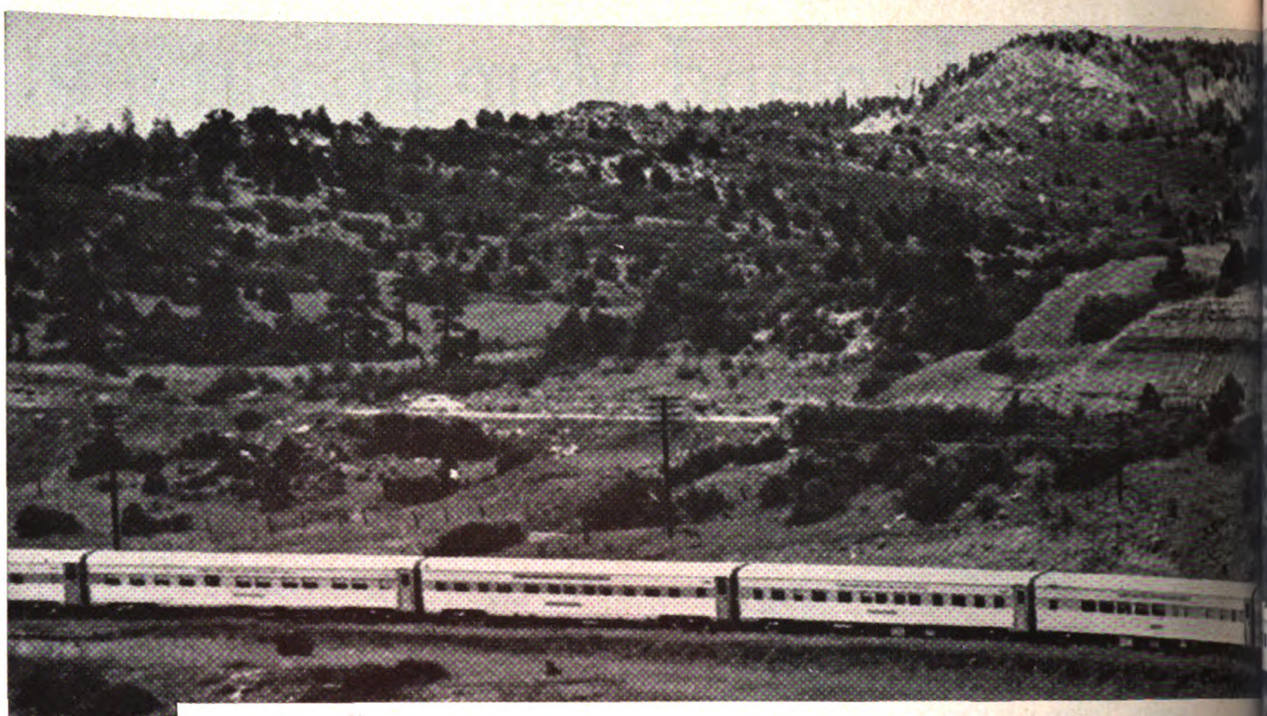

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one of the factors that has led to the increasing popularity of the vapor degreaser in recent years.

Vapor Degreaser

Competing with the time-honored steam jet method of cleaning we now have the vapor degreaser, Fig. 5. At present, preference is probably about equally divided between the two. In order to judge its merits, let's see how the vapor degreaser works, Fig. 6.

Chlorinated hydrocarbon solvents, trichlorethylene and perchlorethylene boil at approximately 180 and 250 deg F respectively. The latter, as you see, has a boiling point above that of water (212 deg F). The solvent is heated to the boiling point in a large, deep container open at the top. This is usually done with steam coils in the bottom of the tank. Other heating methods may be used, but care must be taken not to have too great a temperature difference. At higher temperatures the solvent may break down and form dangerous chemicals. The upper part of the container is kept chilled by water cooling pipes surrounding the open top. This keeps the hot vapors from escaping. As they reach this chilled area they condense and the liquid solvent falls back into the tank like rain.

When a part, such as an armature of field coil is to be cleaned, it is lowered into the hot vapor in the tank. At once the part becomes wet with solvent because it is colder than the hot vapor. You've seen the same thing happen with a pitcher of ice water on a hot, humid day, Fig. 7. The cold pitcher chills the air around it. This causes the water vapor to condense and wet the outside of the pitcher. In the same way the cold part chills the solvent vapor, and liquid solvent condenses on its surface. As long as the part remains cool enough, fresh, clean solvent continues to condense on its surface. As soon as the part heats up to the temperature of the vapor this action stops. While it goes on, however, the action is so intense that the part is cleaned in a few minutes.

In addition to the action of the vapor, a powerful jet of clean solvent can be squirted on the suspended part to dislodge large masses of dirt. Solvent for this purpose can be drawn from the gutters under the condensing coils near the top of the degreaser tank. From there it can be run into a separate tank and then pumped through a hose and nozzle. The strong jet of liquid adds a scrubbing action to the cleaning process. An armored hose with a special plastic lining will give longer life in this service.

If a cleaner is used that has a higher boiling point than water, the part will become hot enough to drive off moisture. In this way cleaning and baking can be combined. Parts with pockets should be tilted or upended to spill out the solvent before leaving the tank.

After the cleaned part is removed from the vapor degreaser it is ready to be worked on as soon as it has cooled enough to handle. A dusty residue often remains after the solvent has evaporated. This can be blown off with an air hose. Be sure to do the job in front of a suitable exhaust hood so the dust will be carried away. As with other cleaning solutions, only the grease and oil are removed, and whatever dirt floats off with the liquids. The imbedded or mechanically adhering dirt will remain.

The vapor degreaser has the advantage of cleaning the part with a continuously distilled, clean solution. Also, no oven is required for drying after cleaning. On the other hand, the solvents used are very powerful and work fast. If proper precautions are not used and the part is left in the vapor to long, the insulating varnish, as well as the dirt, may be entirely removed. This is especially true of the various silicones when used on the surface where the vapor can get at them. While excellent for high temperature, the silicones need extra care in this cleaning process because they are so soluble. In any case, leave the part in the vapor only long enough to remove the soluble dirt. Experience and observation of the results will soon teach how long the various parts need for cleaning.

From another point of view, it's not a bad idea to remove a little of the outside skin of the insulating varnish. This is the part that may be cracked and have tiny dirt particles embedded in it. Also, removing some of the old skin makes room for a new layer of varnish without increasing the thickness of the entire coat. This helps keep the machine cool in service.

In short, the vapor degreaser is one way to handle a large volume of cleaning work in a minimum time. As a result this method has become firmly established on many properties.

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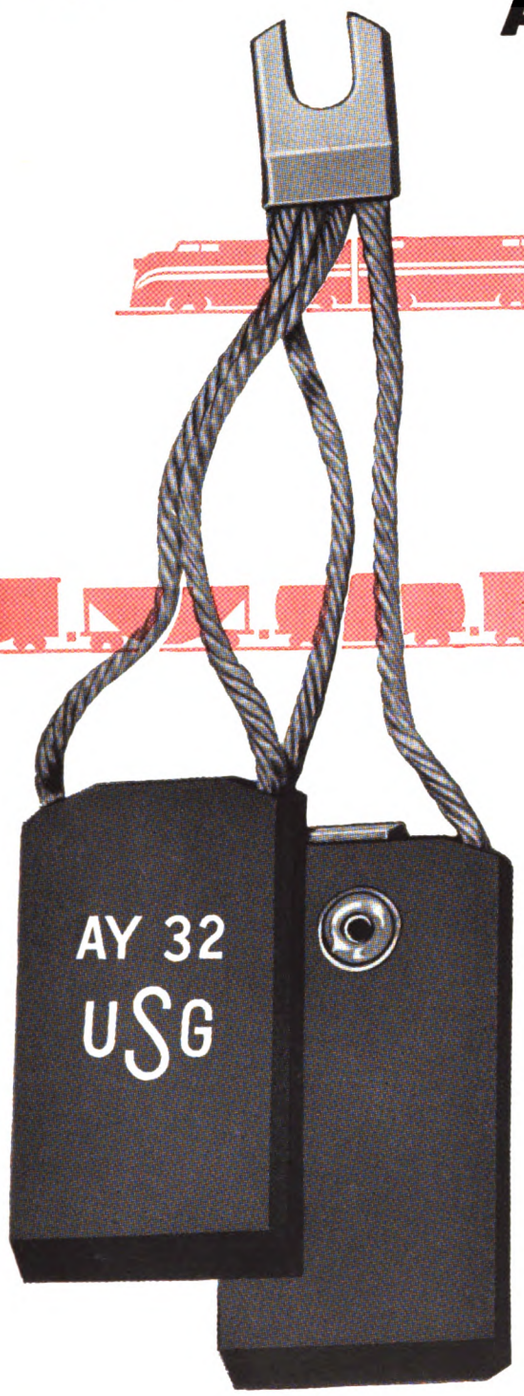

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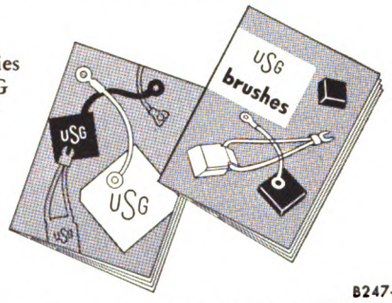

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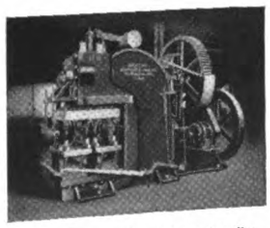

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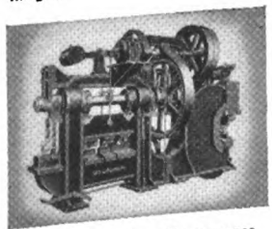

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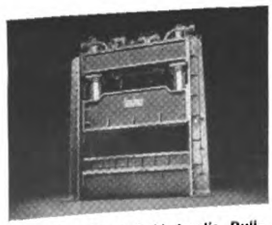

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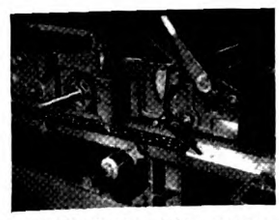

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Remember Number 5

(*continued from page 39*)

Probable Cause of the Trouble

For the operation of the speed control in any one EMD unit, the *ER* relay must be energized and closed. This relay has contacts which open when the relay is de-energized and these contacts interrupt the circuits supplying the *A*, *B*, and *C* solenoids of the governor speed control. The relay has no effect on the circuit to the *D* solenoid.

Thus, de-energizing the *ER* relay will cut out the *A*, *B*, and *C* solenoids, and bring the engine to idle speed if the throttle is in runs 2, 3, 4, 7 or 8.

Should the *ER* relay become de-energized when the throttle is in run 5 or run 6, the *D* solenoid will remain energized and cause the engine to stop.

The *ER* relays in the individual units are normally energized and closed by the current received from the *FP* wire which runs throughout the locomotive. This wire is energized through the *PC* switch (or relay) fuel pump switch or fuel pump fuse.

The *ER* relay in each unit will become de-energized from any of the following causes — note them carefully:

1. Isolation switch not fully in *run* position.
2. Failure of alternating current supply causing *No A-c Voltage* relay to open.
3. Ground protective relay tripped.

Those three items are the ones that most frequently cause an engine to die in the No. 5 throttle position.

In the light of what happened in this case, it is believed that the *Isolation* switch was not fully in *Run* position, or that something caused it to lose full contact as it was starting out on its run.

When the fireman started operating the engine from the lay shaft, he no doubt reclosed the *Isolation* switch and got a good firm contact. When that happened, the *ER* relay became fully energized, which is the condition that must prevail to keep the engine responding to the throttle control.

In any case, no further trouble was experienced with the GP-7 unit after the fireman speeded up the engine from lay shaft control.

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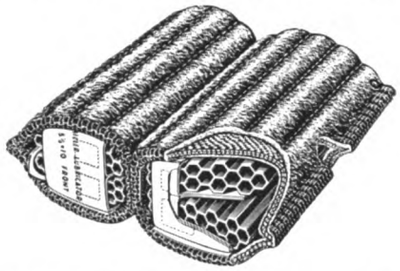

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- This further demonstrates the very low cost per car year of Miller pads in addition to their low initial cost.
- This entire mileage to date has been accumulated on only one contact side of the pad (120,000 miles). Whenever reclaimed, the opposite side of these pads will supply comparable additional mileage. Their reclamation record is outstanding in the industry.
- Each Miller component has great wear life—the pad is built rugged—it accepts wear from the front collar without harm—when reclaimed and reapplied you know its unusual wear-life and durability will provide satisfactory operation until the next reclamation.

$40 per carset in U.S.A. (*all sizes*)

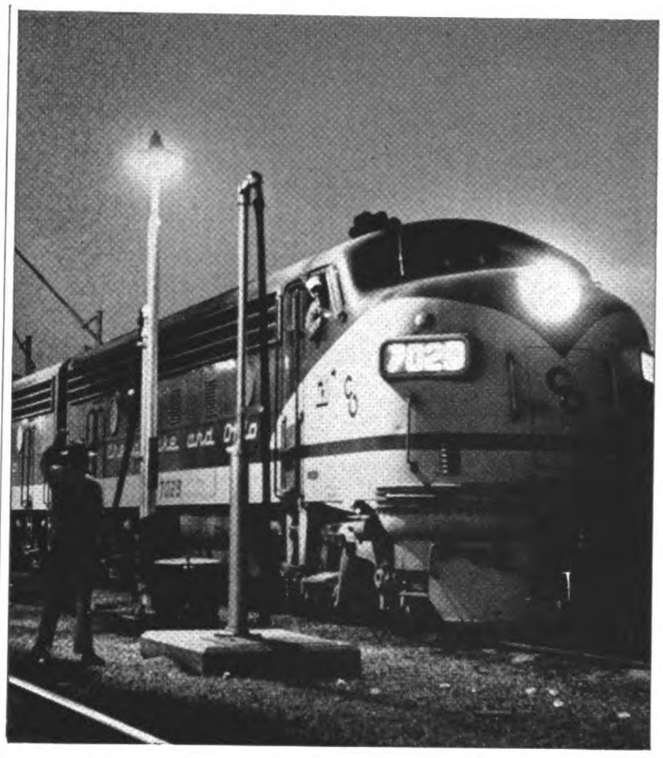
Life expectancy—6 years

Immediate Delivery, Any Quantity

MILLER LUBRICATOR CO.

Winona, Minnesota

In Canada: Napanee Iron Works, Napanee, Ont. and Montreal, Que.



This diesel will change engineers 4,078 times before it changes Ex-Cell-O pins and bushings

Ex-Cell-O Pins and Bushings wear longer because of a super-fine finish and a diamond-hard steel casing which resist clinging sand and grit. Because of this a diesel can travel 32 times around the world, changing engineers 4,078 times before Ex-Cell-O Pins and Bushings need replacement. A wonderful service policy backs up every pin and bushing by Ex-Cell-O, too.

Order directly from the convenient Ex-Cell-O Catalog . . . or contact your Ex-Cell-O Representative.

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DETROIT 32, MICHIGAN

EX-CELL-O FOR PRECISION

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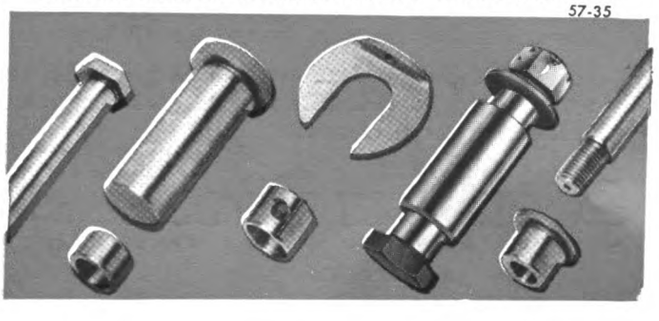
RAILROAD DIVISION • DETROIT, MICHIGAN • LONDON, CANADA

57-35



Snap-on AB Tool Kit

ALL THE TOOLS YOU NEED FOR
AB BRAKE MAINTENANCE

This handy, compact *Snap-on* wrench set includes all the tools you need to dismantle and assemble brake cylinders — remove and apply AB valves and triple valves. And with *Snap-on* sure-fit, sure-grip design, you get extra speed on every job.

The *Snap-on* AB kit is designed specifically for AB brake maintenance — gives you work efficiency that an ordinary selection of tools can't begin to match. That's why so many shops have now standardized on the *Snap-on* sets for AB brake maintenance.

Write for further information on *Snap-on* AB kits. Many other special tool sets are described in the special *Snap-on* railroad catalog. Write for your copy now.

SNAP-ON TOOLS
CORPORATION
Railroad Division
8130-L 28th Avenue • Kenosha, Wisconsin

Fumigation

(*continued from page 33*)

ing upon the fuel atomizes it.

• Carburetor adapted from a Briggs and Statton 2.5-hp engine. The carburetor was mounted in a by-pass of the primary air supply line. A constant percentage of the engine air requirement passed through the carburetor and atomized fuel, carried by this by-passed air, joined the primary air supply and was admitted to the engine.

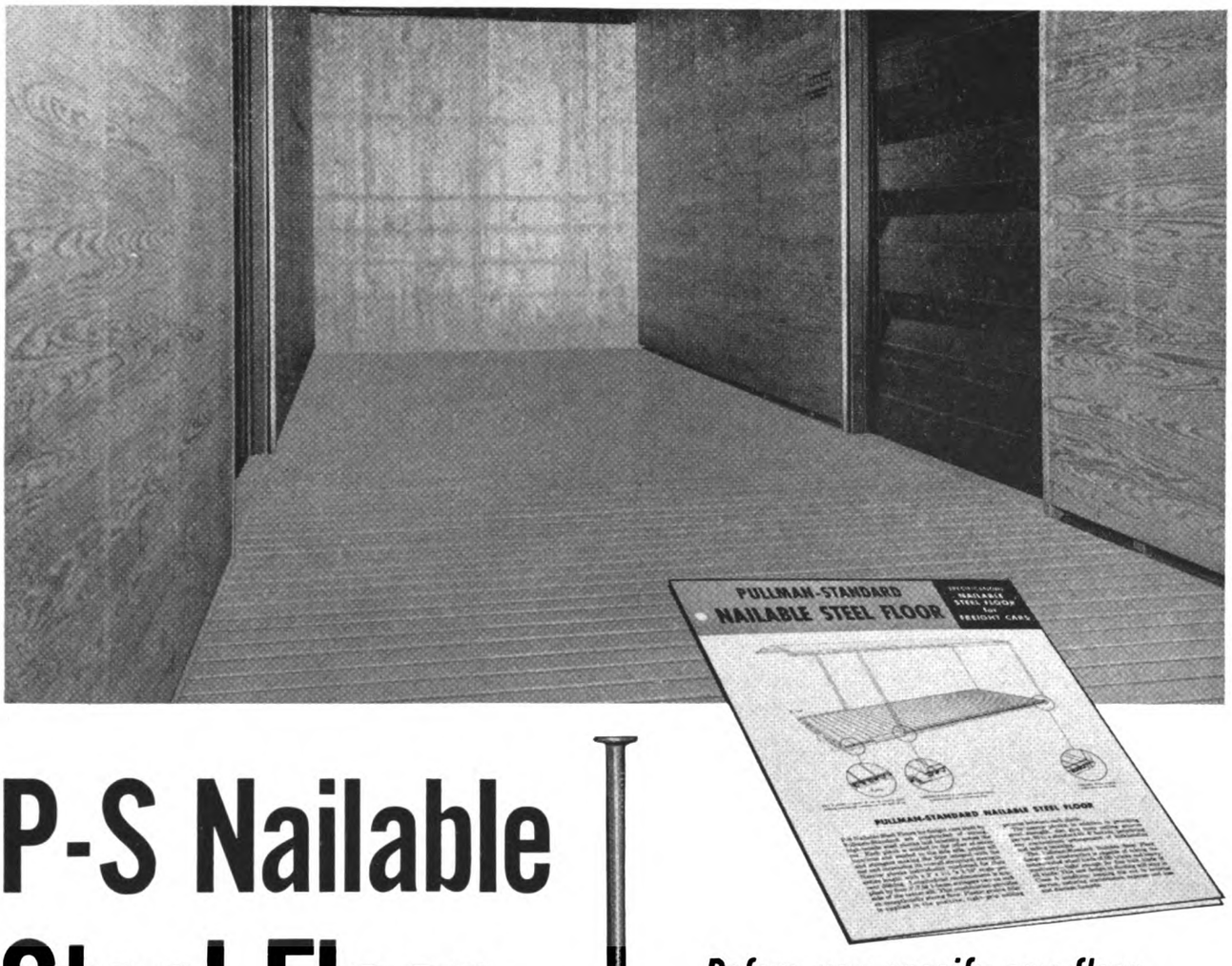
• Vaporizer—a metal container through which all the air to the engine was fed. The bottom of the container was electrically heated above the boiling point of the supplementary fuel so that the fuel would flash immediately into vapor upon hitting it. This resulted in high intake air temperatures.

The most obvious use of fumigation is for reduction of exhaust smoke or increase of smoke-limited power output. From the standpoints of convenience and effectiveness, normal diesel fuel — same as the primary fuel — is recommended for normal fumigation. The complication of the two-fuel system is thereby avoided. A low ignition quality fuel, such as gasoline, used in quantities of 30 to 40 per cent of the total fuel rate could bring higher power boosts, but intake pipe induction of diesel fuel in such quantities would cause preignition under certain operating conditions and control over the engine would be lost. When restricting the amount of supplementary fuel to 10-15 per cent of the total, regular diesel fuels are superior to gasoline if a fine spray is used in both cases.

Fuel Savings

Another promising use of fumigation is to reduce fuel consumption. Apparently all types of diesel engine could improve their fuel consumption by its judicious use. Regular diesel fuel—10 to 15 per cent of the main fuel—should serve as supplementary fuel, and fumigation should be cut out whenever the load drops below an established percentage (between 75 and 85 per cent) of full load. For best fuel economy it is essential that a mist generator

(*continued on page 58*)



P-S Nailable Steel Floor

Before you specify any floor read about P-S floor benefits in this booklet

Take just a moment to discover the benefits of Pullman-Standard Nailable Steel Floor. Write for a copy of this fact-filled booklet. Study it . . . compare it to *any* floor. Compare strength, durability, nail-holding power, long-range economy. Whatever comparisons you make, you'll find P-S Nailable Steel Floor gives your railroad the greatest floor value on the market.

WORLD'S LARGEST BUILDER OF ROLLING STOCK

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221 NORTH LASALLE STREET, CHICAGO 1, ILLINOIS

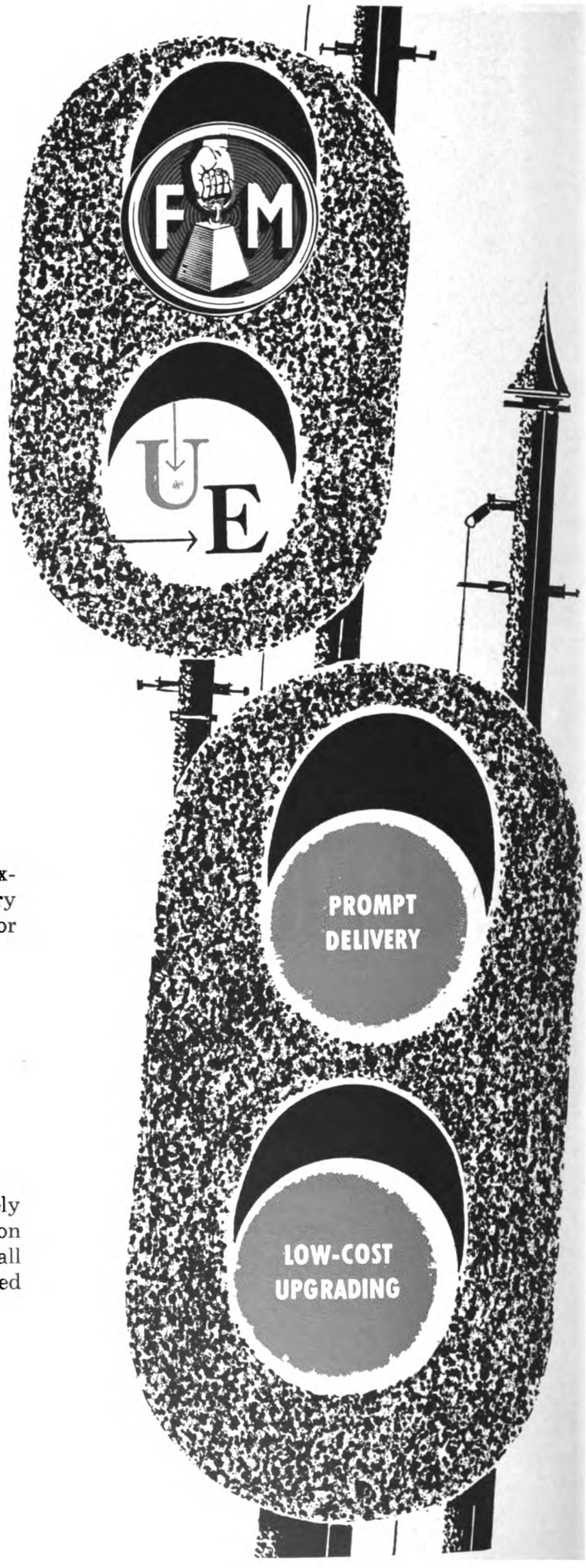
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO

UNIT EXCHANGE

The only engine better than the O-P you have is an Opposed-Piston diesel made better by Fairbanks-Morse — available NOW through F-M Unit Exchange.

Due to a 60% increase in the F-M Unit Exchange program, there are O-P engines of every rating and major accessory group ready for prompt shipment on your order.

This F-M program enables you to effectively meet increased tonnage demands being made on your motive power fleet, yet reduces costs all along the line—lower maintenance, reduced shop facilities and lower parts inventory.



The only engine better than the O-P you now have is one "made better" by F-M craftsmen, who have the skill and techniques acquired through daily experience with only *one* engine design.

F-M's continual search for better engine performance and life can substantially improve the O-P engine and its components of five to ten years ago in many respects. Unit Exchange equipment meets the newest specifications.

Each engine, blower, pump, injection system, generator and traction motor in the F-M Unit Exchange program is warranted to give the same performance as new equipment.

For full details and delivery schedules, write: Diesel Locomotive Service Department, Fairbanks, Morse & Co., Chicago 5, Illinois.

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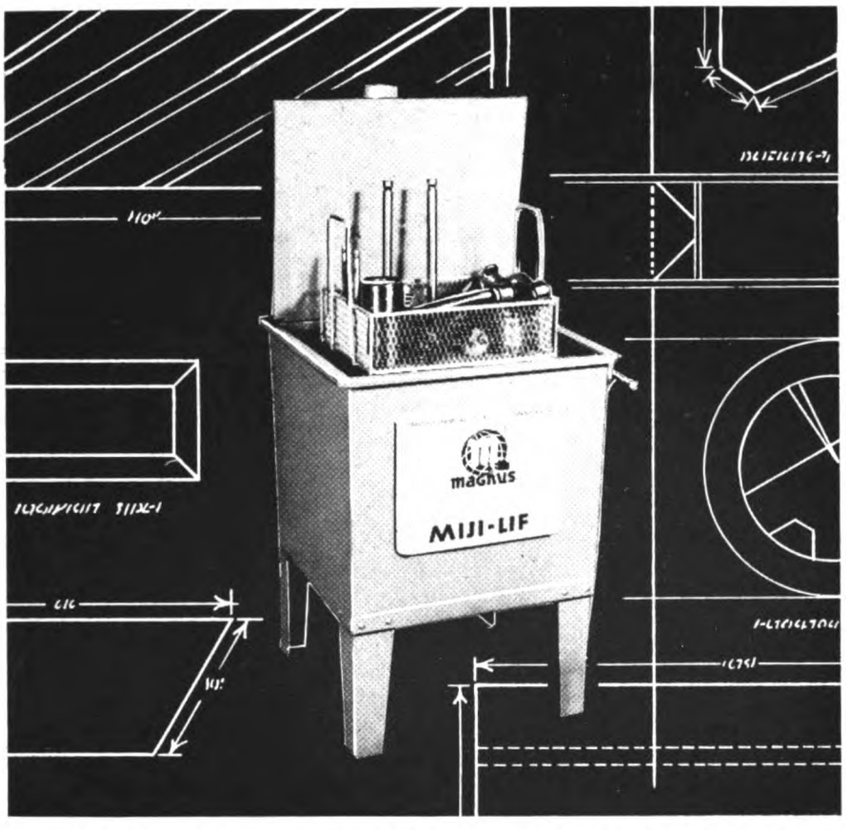
a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS



NEW, LOW-COST PARTS CLEANING MACHINE FITS *ANY* SHOP BUDGET

This new, agitating cleaning machine fills a cost-reducing need in your shop.

Look at these advantages!

- Thorough cleaning by mechanical agitation
- Cleans 75 lbs. of parts at one time, faster
- Air powered—one lever operation
- Low cost—less than $300
- Uses cold or heated cleaning solutions
- Fits 2′ x 2′ floor space or on bench
- Agitating platform raises out of solution for loading, unloading and inspection of parts

IDEAL FOR:

DIESEL INJECTORS
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INTERESTED? Write for Bulletin 708-ML Magnus, 77 South Ave., Garwood, N. J.

RAILROAD DIVISION
MAGNUS CHEMICAL CO., INC.
magnus a world-wide organization specializing in cleaning and protection of all surfaces.

Fumigation

(*Continued from page 54*)

or equivalent be used. With Micro-Fog, full-load fuel economy could be improved by some 10 per cent, while with an ordinary pneumatic spray nozzle only about 5 per cent.

The saving in fuel consumption will be less in two-stroke cycle engines where much air is used for scavenging the cylinder. Assuming that the short-circuited air amounts to 25 per cent, which is a good average figure for diesel engines with unsymmetrical timing, one quarter of the fumigated fuel would pass unburned into the exhaust. In order to minimize it, a reduction of the short circuiting and a reduction of the fumigation rate seems desirable.

The same holds, but to a much lesser degree, for supercharged four-stroke cycle engines with considerable valve overlap. However, the valve overlap is never so large that it would materially affect the economy of fumigation.

At present three factors are in the way of using the Norgren Micro-Fog mist generator on commercial engines: cost, bulk, and air consumption. The reason the Micro-Fog is so large and eats up so much horsepower is that only about 2 per cent of the total amount of atomized liquid is discharged as a mist with drop sizes under four microns and the other 98 per cent with larger drop sizes is returned to the tank.

A less extravagant atomizer is an ordinary pneumatic spray nozzle which also operates with compressed air but uses only about two pounds of air per pound of liquid, roughly one fiftieth as much as the Micro-Fog.

Still another application of the fumigation technique is to be able to burn fuels of low ignition quality in compression-ignition engines. The use of such fuels may offer economic advantage due to the price differential, or may be forced upon us by the nonavailability of regular diesel fuels in an emergency.

High-speed diesel engines have difficulty in burning diesel fuels of about 35 cetane number at light load or idle, although operation may be satisfactory at heavier loads. In

(*Continued on page 60*)

HOW EFFICIENT IS THIS OPERATION?
HOW GOOD
IS THE FINISHED PRODUCT?

Whether you are concerned with manufacturing or with purchasing rolling stock, these are questions of vital concern to you—for ultimately they govern the durability and cost of the end product. Here is just one example how HELIARC welding is helping railroads gain new product quality at substantial savings . . . the unit being fabricated is a galvanized iron and mild steel refrigerator car.

Welding Speeds Average 30 In. Per Minute

Semi-automatic welding requires no special skill, and speeds two to three times faster than manual welding can be easily maintained. The HELIARC welded side and floor panels shown are fabricated of 14 and 20 gage galvanized iron and mild steel.

309 Ft. Of Top-Quality Welds Per Car . . . Minus Flux

In HELIARC welding, argon gas automatically shields the weld puddle from contaminating effects of the atmosphere. All 31 butt, lap, and flange joints in each car are of the highest quality.

Find out about the particular welding installation that can increase your production speed and unit quality. Call your local LINDE representative for detailed information on LINDE's modern methods for joining metals.

Semi-automatic HELIARC welding torch speeds and simplifies fabrication of refrigerator cars.

RAILROAD DEPARTMENT

LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

The familiar symbol of over forty years' service to the railroad industry.

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In Canada: LINDE COMPANY, Division of Union Carbide Canada Limited, Toronto

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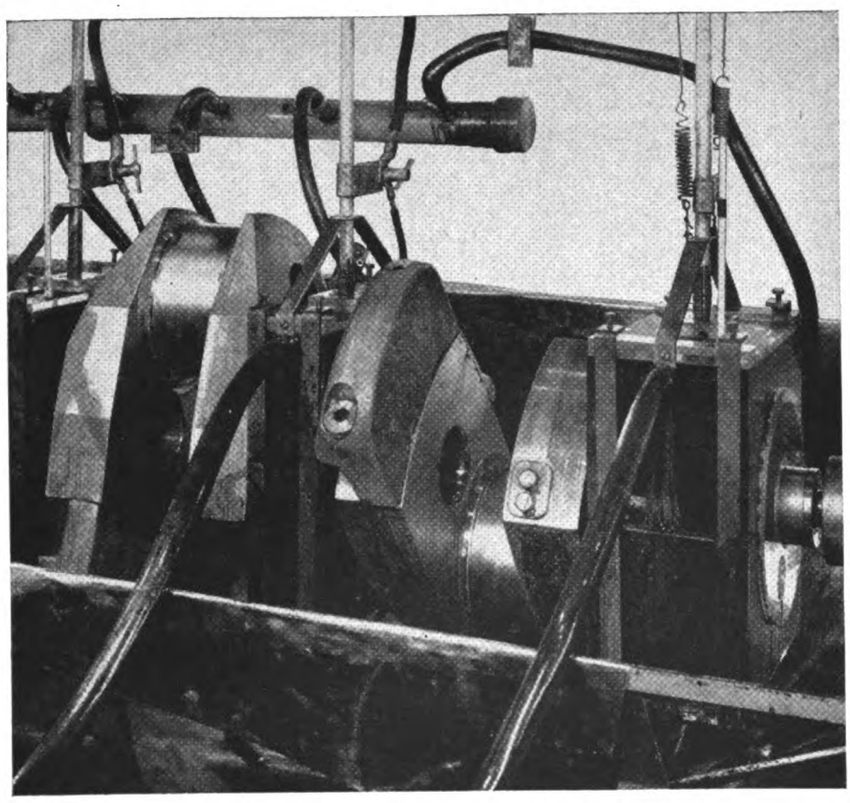
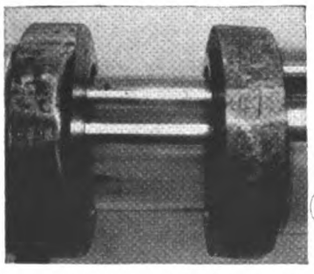


THIS REBUILT CRANKSHAFT IS CHROMIUM PLATED BY A SPECIAL NATIONAL FORGE PROCESS

When your crankshaft is reconditioned at National Forge, here's how it is chrome plated. Each bearing surface is individually boxed and plate thickness is built up only as required. Different thicknesses—over 1/8" if needed—can be added to different surfaces of the same crank. Because only the boxed surfaces are exposed to plating action the fillet areas retain their original strength.

When applied by National Forge specialists, chrome plating is uniform and smooth. Regrinding is kept to a minimum and your reconditioned crankshafts are returned to you meeting the original shaft's specifications.

No other plating company has National Forge's experience in handling both new and rebuilt crankshafts. So why not try National Forge specialists on your crankshaft rebuilding jobs?



This is a finished, repaired crankshaft after processing by National Forge.

For more details on crankshaft repair, write for Bulletin RC-1.

NATIONAL FORGE AND ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.

Fumigation

(*Continued from page 58*)

such a case fumigation of part of the main fuel at light loads will allow satisfactory operation at all loads.

If the main fuel has still lower ignition quality, as motor gasoline (approximately 20 cetane), the fumigation of the main fuel helps some, but better results are obtained by the fumigation of a higher cetane fuel doped with a cetane-improving additive. The ignition quality of the injected fuel ceases to limit its use in a diesel engine if the fumigation fuel is properly selected. Diesel fuel with a cetane of 29 could be satisfactorily used in a small, high-speed, open-chamber engine with a supplementary fuel of 44 cetane doped with 2½ per cent amyl nitrate.

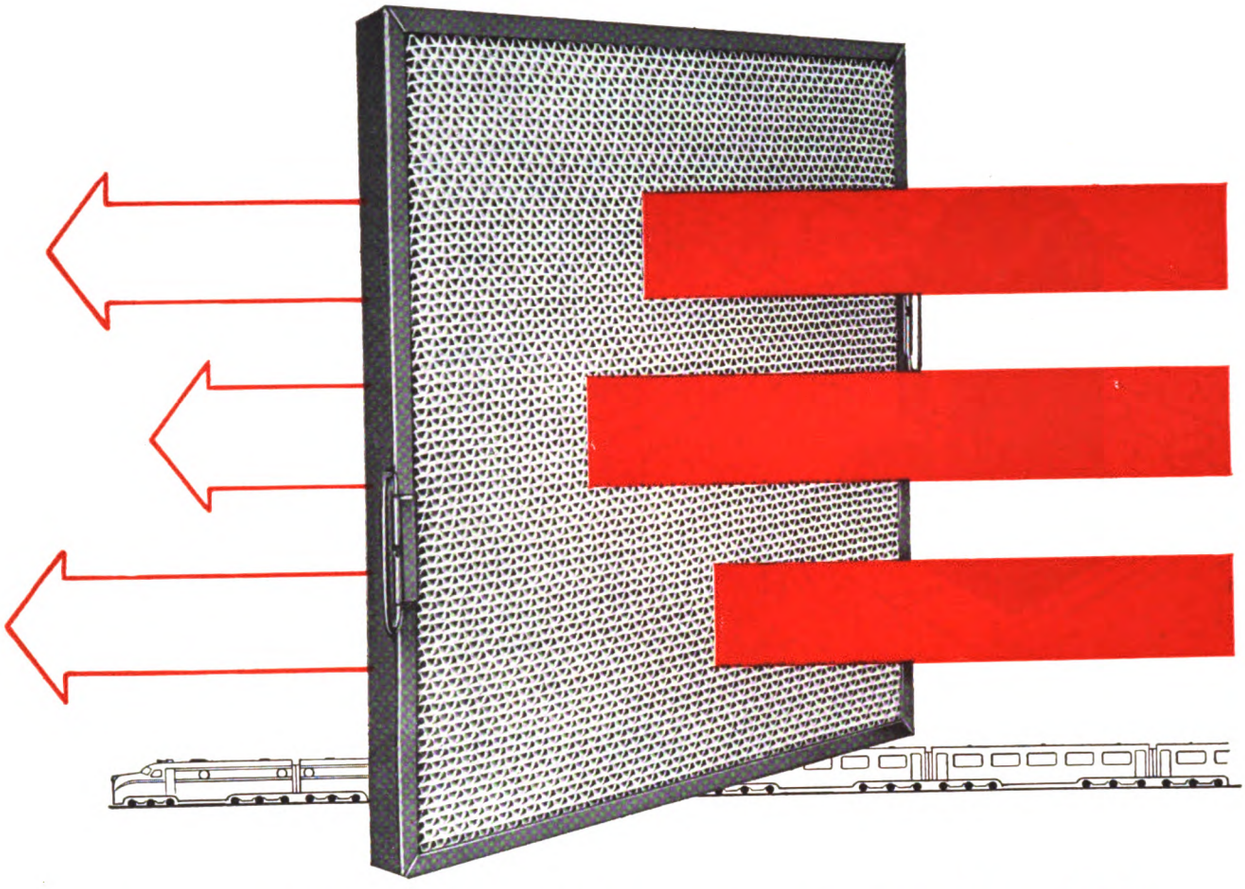
The fuel consumption at light load is always poor with fumigation; therefore, it should be used only when necessary and at the lowest possible rate that will insure steady running. Accessory benefits of fumigation are lower exhaust temperature, smoother combustion, reduced cylinder deposits, and probably reduced bearing wear. A good field for fumigation is in diesel driven trucks. It would enable diesel trucks to take grades without smoking. Neither the fuel bill nor the maintenance cost should be increased.

Locomotive Possibilities

An equally promising field for fumigation is railroad locomotives. Smoke reduction here may be secondary to the saving in fuel costs that can be achieved. The nature of locomotive operation is such that they run full load or at idle most of the time. This is favorable to fumigation. All locomotives are equipped with good size air compressors which can furnish all the air needed. Fumigation should permit the use of an economy fuel—a residual distillate blend with a cetane number of 25 to 35—which now costs at least ¾ cent less than standard No. 2 diesel fuel ordinarily used.

If such a low cetane fuel is used for main fuel, it is advantageous to

(*Continued on page 62*)



Cut maintenance, increase engine life with Esso AIRFIL® Coating Oil

Esso's new AIRFIL Coating Oil for diesel engine air filters has such great dirt pick-up qualities that it can substantially cut maintenance costs and increase engine life. This is possible because of the reduction in abrasive wear, lessening the need for replacements of engine parts. You, too, can profit from these benefits by using Esso AIRFIL Coating Oil in diesel air intake filters, and in air-conditioning filters.

Esso AIRFIL COATING OIL offers three important advantages:

1. Easy to apply...won't drip off. In liquid form when hot, it may be applied quickly in the desired quantity, while at normal temperatures, it is a gel-like solid that won't run off.

2. Superior wicking qualities mean a continually fresh surface is presented to the air. Successive layers of dust are rapidly wetted, keeping dirt-retaining efficiency at a maximum.

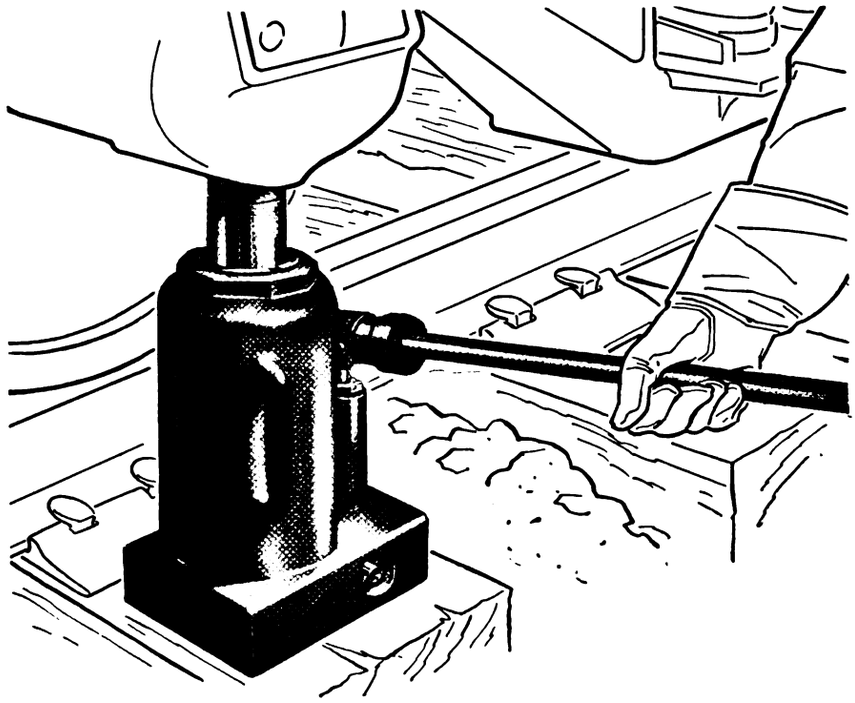
3. Insoluble in water . . . won't emulsify, and so resists removal by rain or snow, yet it can be removed quickly by hot detergent wash or steam blast.

Esso offers a complete line of dependable railroad products. Valuable years of experience in research and development, combined with continual testing on the road and in the lab, stand back of the outstanding performance of Esso Railroad products.

Esso

RAILROAD PRODUCTS

For data sheet regarding specifications of AIRFIL Coating Oil, write to Esso Standard Oil Company, Railroad Sales Division, 15 West 51st Street, New York 19, N. Y.



NEW! A 35 Ton Hydraulic Journal Jack

First in the Industry!

You asked for it and here it is—a brand new jack designed and built especially for servicing heavier freight cars. It can raise 35 tons 6 inches—is only 9.7 high—weighs but 55 pounds. With the 35H9.7, the job of inspecting and renewing journal brasses can now be done without the danger of overloading a lower capacity hydraulic journal jack—and the work can be done faster with less effort! If you have the problem of lifting heavy cars, we suggest you get complete details on this new 35 ton hydraulic journal jack immediately. Write the world's oldest and largest manufacturer of lifting jacks for bulletin AD29-G.

DUFF-NORTON

Duff-Norton Jacks

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P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

Fumigation

(*Continued from page 60*)

fumigate a higher cetane fuel (doped or undoped) when the engine idles, and then inject and burn only the main fuel when the engine runs at high load. Because fuel consumption is low at idle and fumigation constitutes a small portion of this, a relatively small additive fuel tank—not more than 40 gal—is adequate to feed the additive spray nozzle for the longest runs. The full load fumigation is effected by a second spray nozzle which is supplied with fuel from the main tank.

At Idle, 1 and 2 throttle positions additive fuel is fumigated through the additive spray nozzle. At 7 and 8 notches main fuel is fumigated through the main spray nozzle. At 3, 4, 5 and 6 notches, no fuel is introduced through the air intake.

The operation is completely automatic. A railroad can have the benefit of two-fuel operation without having a two-fuel system with two large tanks or mixers. In addition, it lowers fuel consumption. The two savings should add up to 5 to 10 per cent total saving in fuel costs. The savings will be higher when an economical mist generator becomes commercially available.

Based on this work, the Pennsy already is testing equipment for application to its locomotive fleet.

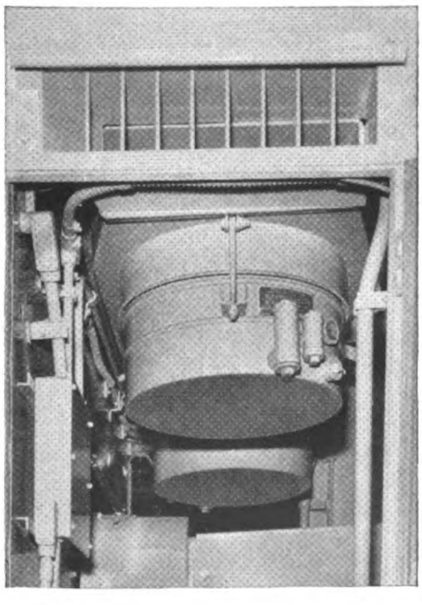
All-Welded Aluminum Doors

(*Continued from page 32*)

will be supplemented by accelerated service tests of several doors in a commercial laboratory. One test will subject the door to 48,000 complete opening-and-closing cycles, simulating about 30 years of actual service, based on eight openings in each of 200 annual working days. In a second test, the doors will be placed horizontally, supported by only the edge members, and subjected to uniform loads up to 200 lb per sq ft to simulate maximum bulk car loading with doors in closed position. An ASTM corrosion test will be made, with doors exposed to salt spray atmosphere continuously for 240 hr.

On these diesel-electric locomotives...

Intake air is thoroughly cleaned with AIR-MAZE oil bath filters



For over four years, General Electric locomotives for export service have relied on Air-Maze oil bath filters for cleaning the intake air to their efficient Cooper-Bessemer diesels. And for good reason:

Air-Maze oil bath filters maintain at least 92% efficiency* . . . even at lowest locomotive speeds. That's because their inherently high efficiency does not depend on high air velocity as do other filtering devices.

For most locomotive service requirements, maintenance is confined to simply checking oil level every month, filter oil changes at three month intervals, and cleaning a bowl once a year.

Reports from leading railroads in this country show that Air-Maze oil bath filters double . . . often triple . . . power assembly life. Savings in engine and filter maintenance often pay for the cost of the filter in less than a year.

These important advantages can be applied to all locomotive diesels today. For complete data, call us or contact your locomotive builder. The Air-Maze Corporation, Cleveland 28, Ohio. Dept. RL-12

**With Standard Air Cleaner Fine test dust, 39% of which is less than 5 microns.*

The biggest names in diesels are protected by Air-Maze filters.

AIR-MAZE

The Filter Engineers

ENGINE AIR FILTERS • CAR BODY FILTERS • LUBE OIL FILTERS • PASSENGER CAR FILTERS

How Oakite Steam Gun Cleaning delivers low-cost end results

Better *results* almost always mean bigger *savings* in cleaning. So use the best in methods as well as materials—it's least expensive in the end.

Cleaning with this Oakite Steam-Detergent Gun, for example, amplifies the penetrating, soil-loosening action of cleaning compound by means of steam heat and jet force.

It blasts out even heaviest, most stubborn soils from hard-to-reach places. It cuts clean-up and rinsing time as much as half. That's a *big* contribution to real economy.

This money-saving equipment has no end of uses. Connected to your steam supply, the gun can clean traction motors, truck, locomotive frames—even strip paint. Want it demonstrated in your shop to your men? Just write OAKITE PRODUCTS, INC., 46 Rector Street, New York 6, N. Y.

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OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

. . . gives you the important advantage
LOW-COST END RESULTS

Export Division Cable Address: Oakite

RAILROAD DIVISION

What's New

(Continued from page 24)

close air seal. Substantial ball bearings contribute to long, smooth running, and there are fewer moving parts.

A power regulator permits running a series of nuts down to the same degree of tightness. Power regulator setting No. 5 gives full power to blast loose tight, rusted, and frozen nuts. Only a 180-deg turn is needed to vary power from setting No. 5 to setting No. 1.

An angle attachment is available for reaching ratchet wrench spots. A molded rubber ring protects the nose of the wrench, and a wire hanger permits hanging when not in use, or use in a suspended position.

Both models weigh 5½ lb. Model 315 with a ½-in. drive has a ⅝-in. bolt size capacity. Model 317 drives with a ⅝-in. square and has an 11/16-in. bolt size capacity. A metal carrying case is available for wrench and sockets. *Albertson & Co., Dept. RLC, Sioux City, Iowa.*

Upholstery Material

Naugafoam is a permanently combined latex foam rubber and vinyl upholstery for upholstering backs, seats, front trim and arms of chairs, and for covering ottomans and cushions.

It is formed into a heat sealed sand-

(Continued on page 66)

NEW...

BROWNHOIST 150 TON DIESEL WRECKING CRANE

Designed specifically to meet rail, bridge and trestle load restrictions, the new Brownhoist 150 ton Diesel Wrecking Crane embodies the rugged construction, greater efficiency and low maintenance features found on the famous Brownhoist 250 Ton Diesel Wrecking Crane. Diesel engine is equipped with a torque convertor, and the crane travels on 2, six-wheel equalized steel side frame trucks. Operating cab is in right front corner with controls arranged for convenience and efficiency. All clutches are air operated.
Write for complete information.

204

BROWNHOIST

CLAMSHELL BUCKET

250 TON WRECKING CRANE

COAL-ORE BRIDGE

CAR DUMPER

LOCOMOTIVE CRANE

INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, San Francisco, Montreal, Canada • AGENCIES: Detroit, Birmingham, Houston

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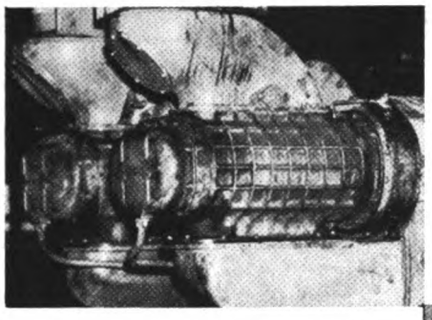
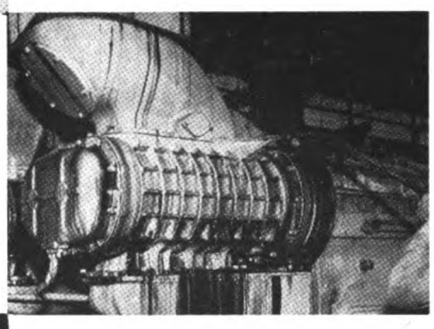
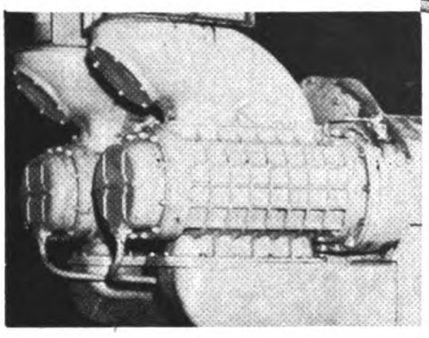


DIRTY DIESELS



COME CLEAN QUICKLY



WITH

LIX

DIESEL KLEAN HEAVY!

More and more railroads are relying on LIX Diesel Klean Heavy—for periodic surface cleaning that keeps diesel engines shining bright, and for overhaul cleaning of all parts such as pistons, bearings, liners, filters, lube oil coolers, injection nozzles, brush holders, airbrake assemblies, etc. Lix cleans FASTER and BETTER—at LOWER COST per job. It SOAKS away caked carbon, grit, grease and grime . . . NO BRUSHING OR SCRAPING necessary. It leaves no granular deposits . . . reduces after-rusting . . . is harmless to all metals during cleaning cycle . . . and all metals can be cleaned in same tank. Lix is SAFER, too—is of low toxicity and, because of its high flash point, is not a fire hazard.

Because of its long life without frequent charges, Lix Diesel Klean Heavy is far more ECONOMICAL in the long run than "less expensive" cleaners!

WRITE, WIRE *or* PHONE *for a no-cost, no-obligation* DEMONSTRATION *in your shop . . . see how you can cut cleaning time and reduce diesel maintenance costs!*

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix PRODUCTS OF RESEARCH CORPORATION
(OF MISSOURI)
300 WEST 80TH, DEPT. RL12
KANSAS CITY, MISSOURI

"Leadership in Industrial Cleaning"

wich, according to the manufacturer, with foam rubber ⅜ in. thick in the middle, 25 ounce vinyl upholstery on top, and cotton sheathing on the bottom. The upholstery is shaped into 1¼ in. quilted channels.

As an upholstery material it is said to combine the resiliency of foam rubber with the color, durability and easy-to-clean features of vinyl.

Naugafoam comes in 15-yd rolls, 54 in. wide. Colors are crimson, yew, green, ginger brown, black and parchment. *United States Rubber Company, Dept. RLC, 1230 Avenue of the Americas, New York 20.*

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

P-S FREIGHT CARS AND PARTS.—24-page catalog, in color, contains descriptions and specifications of the PS-1 box car, the PS-2 covered hopper car, the PS-3 hopper car, the PS-4 flat car, and the PS-5 gondola, with similar data also on P-S freight-car parts—sides, ends, roofs, floors, underframes, doors, side bearings, floor clips, etc. (Write: *Pullman-Standard Car Manufacturing Company*, Dept. RLC, 321 North La Salle st., Chicago 1.)

SLING CHAINS.—4-page bulletin DH-101 discusses properties and capabilities of ACCO Registered sling chains. Lists seven main points to consider when ordering sling chains. Chart gives working load limits of two-leg chains of X-weld 125 or Endweldur 125 chain, based on 50 per cent proof tests. (Write: *American Chain & Cable Co.*, Dept. RLC, 929 Connecticut ave., Bridgeport 2, Conn.)

(Continued on page 68)

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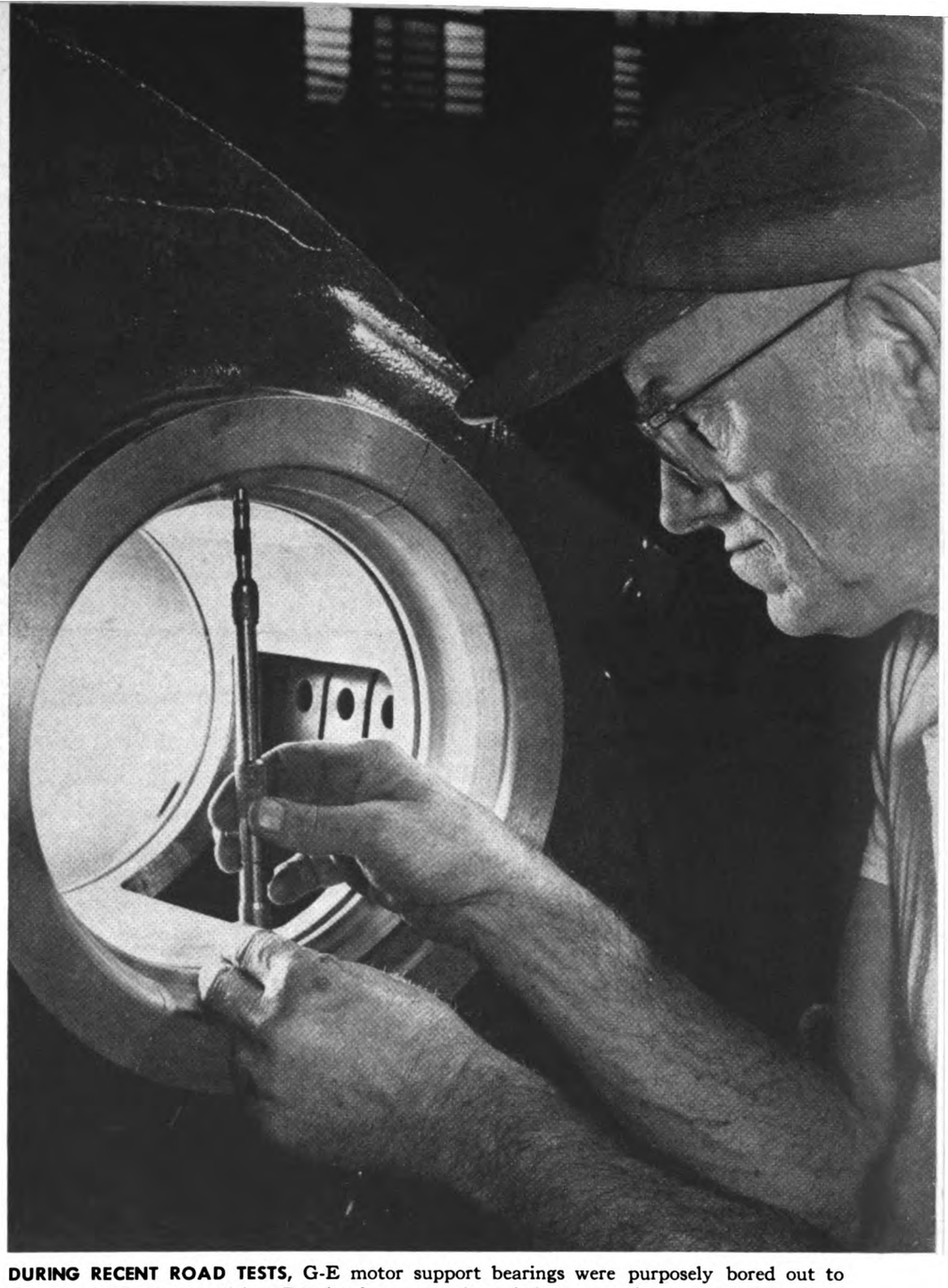

DURING RECENT ROAD TESTS, G-E motor support bearings were purposely bored out to simulate half-worn condition. Results from tests showed that even after wear, G-E bearings continue to save oil by returning excess oil to the axle cap.

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YOUR NEAREST G-E RAILROAD REGIONAL PARTS CENTER or your locomotive builder will be glad to tell you about all of the features which make G-E motor support bearings your best buy. Always specify G-E traction motor support bearings . . . the bearings that are designed as an integral part of your G-E traction system. General Electric Company, Locomotive and Car Equipment Dept., Erie, Pa. 128-41

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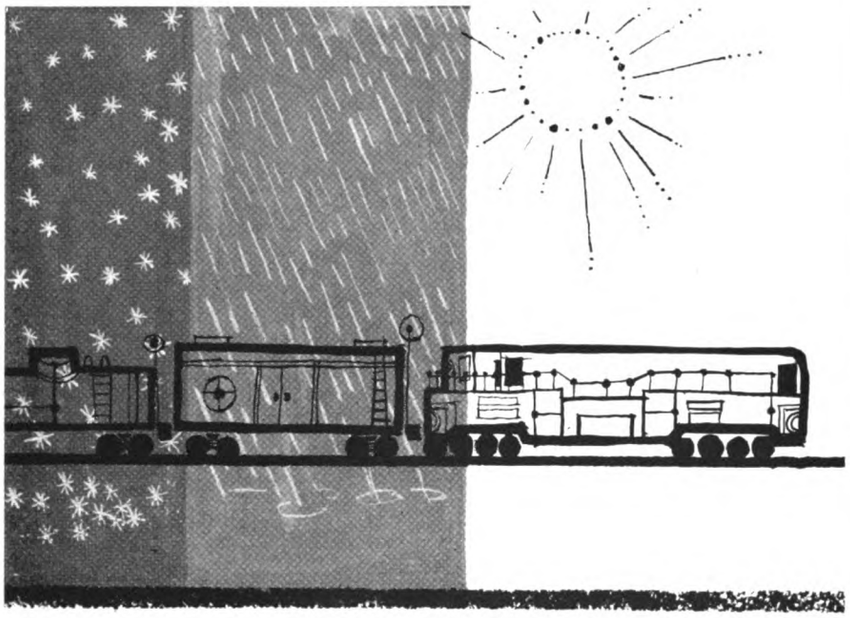

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Helps From Manufacturers

(Continued from page 66)

FREE-PISTON-ENGINE RESEARCH. —36-page booklet traces development of new FP-165 turbocharged, free-piston engine. Presents diagrams, specifications and performance characteristics on each of five prototype models, and psecifications and estimated performance characteristics on variations of FP-165 gasifier-turbine power plants. (Write: *Hamilton Division, Baldwin-Lima-Hamilton Corporation,* Dept. RLC, Hamilton, Ohio.)

RECONDITIONING CRANKSHAFTS. —Eight-page booklet discusses the reconditioning of diesel crankshafts and illustrates operations involved. (Write: *National Forge & Ordnance Co.,* Dept. RLC, Irvine, Pa.)

AIR COMPRESSOR LUBRICANT.—14-page illustrated booklet discusses Pydraul AC, a fire-resistant synthetic lubricant for air compressors. Contains data on air compressors for conversion from petroleum products to Pydraul AC. Includes typical properties. (Write: *Monsanto Chemical Company, Organic Chemicals Division,* Dept. RLC, St. Louis 24.)

SOLID AND OPEN STEEL FLOORING.—8-page bulletin No. 50-9 describes five different types of steel for floors, stairs, steps, ramps, catwalks and platforms. Four-way raised-lug pattern solid steel safety plate, and nine different styles of open material illustrated. Plate and panel sizes, fastening methods, tables of safe loads and other engineering data included. (Write: *Joseph T. Ryerson & Son, Inc.,* Dept. RLC, Box 8000-A, Chicago 80.)

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The information in this newly-published book is not available in any other single source. Walter Lucas spent months of intensive research among rare and out-of-print locomotive cyclopedias to cull out this fascinating material. Some of the volumes he took his pictures and drawings from are so rare that they are known only to a few libraries and rare book collectors. Most of the information in this great book would be next to impossible for the average railroad fan to find.

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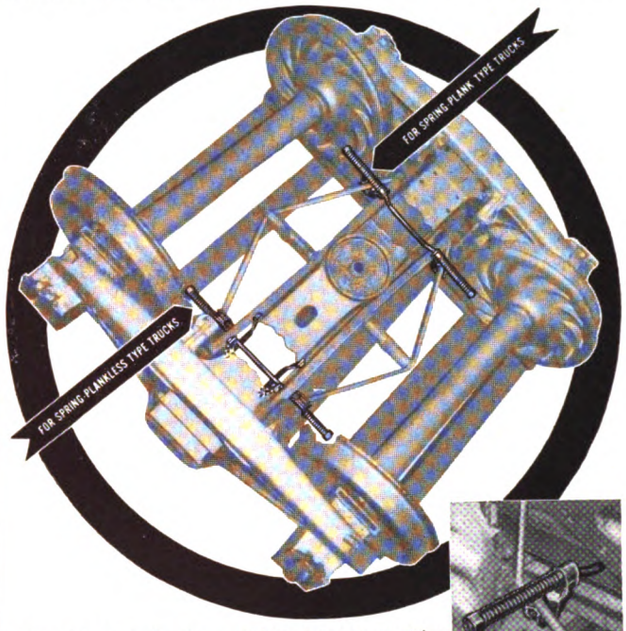
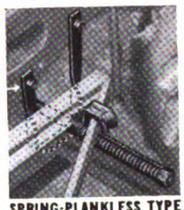


SPRING-PLANK TYPE

The Gripco Brake Beam Safety Support provides the greatest safety at lowest cost. Its dependability has been proven over years of actual service. Gripco Safety Supports are low in original cost, low in application cost and low in maintenance cost, even after years of service.



SPRING-PLANKLESS TYPE
(Safety Loops Included)

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1. One design fits both 5'-6" and 5'-8" wheel base trucks.
2. One rod length and one spring length. One interchangeable casting fits both spring plank and spring plankless trucks.
3. Ideal for interchange repairs. New design permits easy and fast applications under all conditions. Nuts need not be removed to apply or remove the support.

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1. An inexpensive trouble-free support for Rebuilt Car Programs.
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4. Holds brake beam in horizontal position.
5. Holds brake shoe in proper position in relation to the periphery of the wheel.
6. The brake release feature pulls brake shoes away from wheel contact instantly when brakes are released.
7. Prevents unnecessary wheel and shoe wear caused by dragging brake shoes.
8. GRIPCO supports can be removed and reapplied without removing nuts; therefore nuts are furnished in proper position.
9. Brake beams, rods, and levers are held in position under spring tension thus reducing false movements, chattering and wear of hangers, hanger pins and brake heads.
10. Can replace as a billable repair any support except A.A.R. recommended practice (angle-riveted and welded).

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SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

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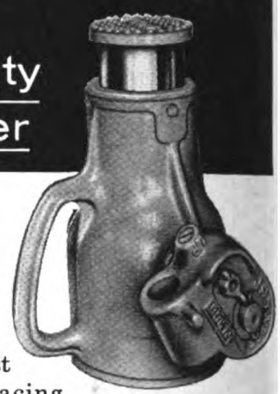
WESTERN LOCOMOTIVE and CAR JACK lifts capacity loads easier



WESTERN has made the first major change in Locomotive and Car Journal Jacks by adding Timken tapered thrust roller bearings, replacing ball bearings. This major improvement means reduced friction, greater speed, easier operation and less maintenance . . . available in 25, 35 and 50 ton capacities. Aluminum or malleable steel housings available in 25 and 35 ton models.

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WRRS

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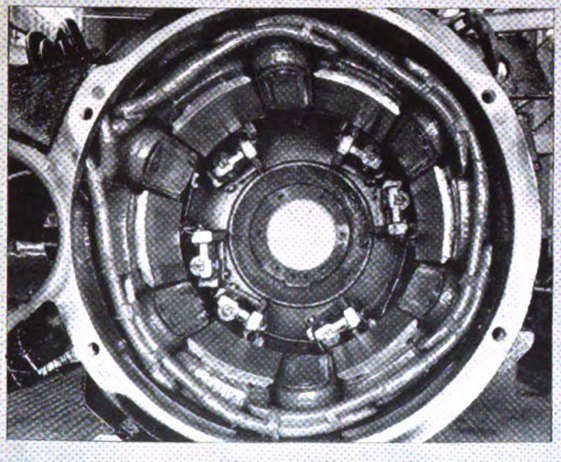
Here's why NATIONAL Plastic Molded COPPER-CLAD Field Coils

Insure Longer Service Life



The main illustration shows a plastic molded, copper-clad interpole field coil for a railway traction motor. The small photo shows a set of such coils assembled with main field coils of the same construction in a traction motor frame. For details on how National plastic molded, copper-clad field coils can help reduce your motor maintenance problems, just drop us a line or call your nearby National field engineer.

1. Snug fit on pole piece eliminates coil movement and provides maximum heat transfer to the frame.
2. Monolithic construction resists damage from mechanical stresses and insures maximum heat dissipation.
3. Void-free insulation prevents penetration of oil, moisture and other deteriorating agents.
4. Proven heat-resistant impregnant imparts high temperature endurance.

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COLUMBUS 16, OHIO, U. S. A.

TRADE MARK

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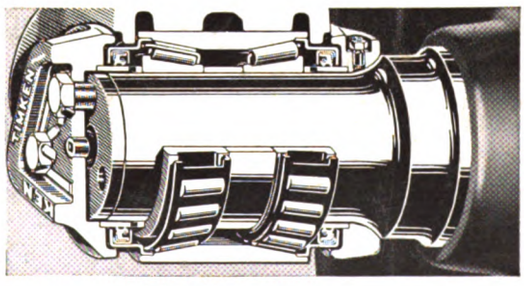
Over ½ of all "Roller Freight" cars now in interchange!

FORTY railroads and other car operators have put over 13,000 "Roller Freight" cars in interchange—letting other railroads share the benefits of their "Roller Freight" equipment.

These forward-looking railroads have learned that "Roller Freight"—freight cars on Timken® tapered roller bearings—are the cure for the hot box problem. "Roller Freight" eliminates the cause of hot boxes—the friction bearing itself. "Roller Freight" in interchange makes for better railroading because the railroads can't be better than their interchange system. And by putting cars into interchange, railroads are speeding the day when all freight will be "Roller Freight".

Eliminating the hot box problem isn't the only way "Roller Freight" speeds service—cuts operating and maintenance costs for the railroads. It cuts terminal bearing inspection time 90%, lubricant costs as much as 95%. Shipments move faster on the road *and* through terminals. It's helping the railroads give ever better freight service—helping them in the battle for business.



More and more railroads are making the switch to "Roller Freight". And they're putting important numbers of these cars in interchange service. When all freight is "Roller Freight" America's railroads will save an estimated $224,000,000 in operating and maintenance costs, earn about 22% on their "Roller Freight" investment. To get the full story, send for our free booklet, "How America's Railroads Can Save $224,000,000 Annually." Write: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

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